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MILLTOWN GROUNDWATER INJURY ASSESSMENT REPORT

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MILLTOWN GROUNDWATER INJURY ASSESSMENT REPORT

Prepared for

Department of Justice
Natural Resource Damage Litigation Program
Helena, Montana

Prepared by

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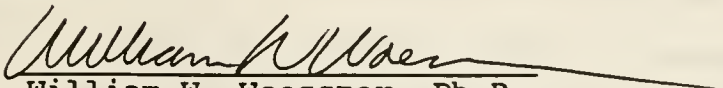

William W. Woessner, Ph.D.

January, 1995

I am prepared to testify as to the appropriateness of the statistical methodologies used in the following reports and that the differences between groundwater conditions of the control and assessment areas, in each one of these reports, are statistically different under D.O.I. Regulation, 43 C.F.R. § 1172(h)(5):

1. *Anaconda Groundwater Injury Assessment Report, Deer Lodge Valley, Montana.* By William W. Woessner, Ph.D., January 1995.
2. *Milltown Groundwater Injury Assessment Report.* By William W. Woessner, Ph.D., January 1995.
3. *Rocker Groundwater Injury Assessment Report, Rocker, Montana.* By William W. Woessner, Ph.D., January 1995.
4. *Montana Pole Treatment Plant Ground Water Injury Assessment, Butte, Montana.* By John J. Metesh, Montana Bureau of Mines and Geology, April 1993.

Richard J. Brand 1/10/95

Richard J. Brand, Ph.D.

EXECUTIVE SUMMARY

This report characterizes the nature and extent of groundwater contamination in the Milltown Reservoir sediments, and the underlying and adjacent sand and gravel aquifer in an area of approximately three square mile surrounding Milltown, Montana. Groundwater has become contaminated with constituents released from over 170 million cubic feet of fine grained reservoir sediment containing mining wastes. Concentrations of arsenic, iron and manganese found in the groundwater exceed primary and/or secondary drinking water standards. These contaminants are released from sources in the reservoir sediment by geochemical processes. Dissolved constituents are carried through the sediments and to the sand and gravel deposits via infiltrating reservoir water. Such releases have been occurring to some degree since dam closure. The groundwater leaving the reservoir contains median concentrations of arsenic, iron and manganese that exceed background levels by over 280 times. Between 16,910 to 110,990 acft/y of contaminated groundwater leaves the fine-grained reservoir sediments and flows into the Milltown area. The volume of groundwater in the Milltown area with contaminant concentrations exceeding drinking water standards ranges between 4,500 and 8,820 acft. The complex three dimensional distribution of the waste source, the presence of the reservoir, the continuous replenishment of the wastes from upstream sources, and the geochemical mechanisms releasing the wastes make control, mitigation or removal of the source extremely difficult. Without effective source removal, the discharge of tens of thousands to hundreds of thousands of acre feet of contaminated groundwater per year will persist from the Milltown Reservoir for hundreds of years.

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INTRODUCTION

This report presents an analysis of the character of the waste sources, and the timing, duration and frequency of their releases to the groundwater system in the vicinity of Milltown, Montana (Figure 1 and Plate 1). It also describes pathways by which hazardous materials enter the groundwater system and the distribution of contaminants.

Site Description

The Milltown valley lies along a northwest-trending section of the Clark Fork River five miles east of Missoula, Montana, (Figure 1). The valley ranges from three-quarters to one mile in width. This report is focused on the Milltown Reservoir and the surrounding three square miles of valley area. The towns of Milltown and Bonner are the main population centers and Champion International Corporation operates a plywood and stud mill immediately north of Milltown.

Climate

The Milltown area has a semi-arid climate with an average annual precipitation of just over 12 in. March and August are the driest months and June the wettest (Titan, 1994). Temperatures average 22.7° F during January and 71.8 ° F during July (Woessner et al., 1984).

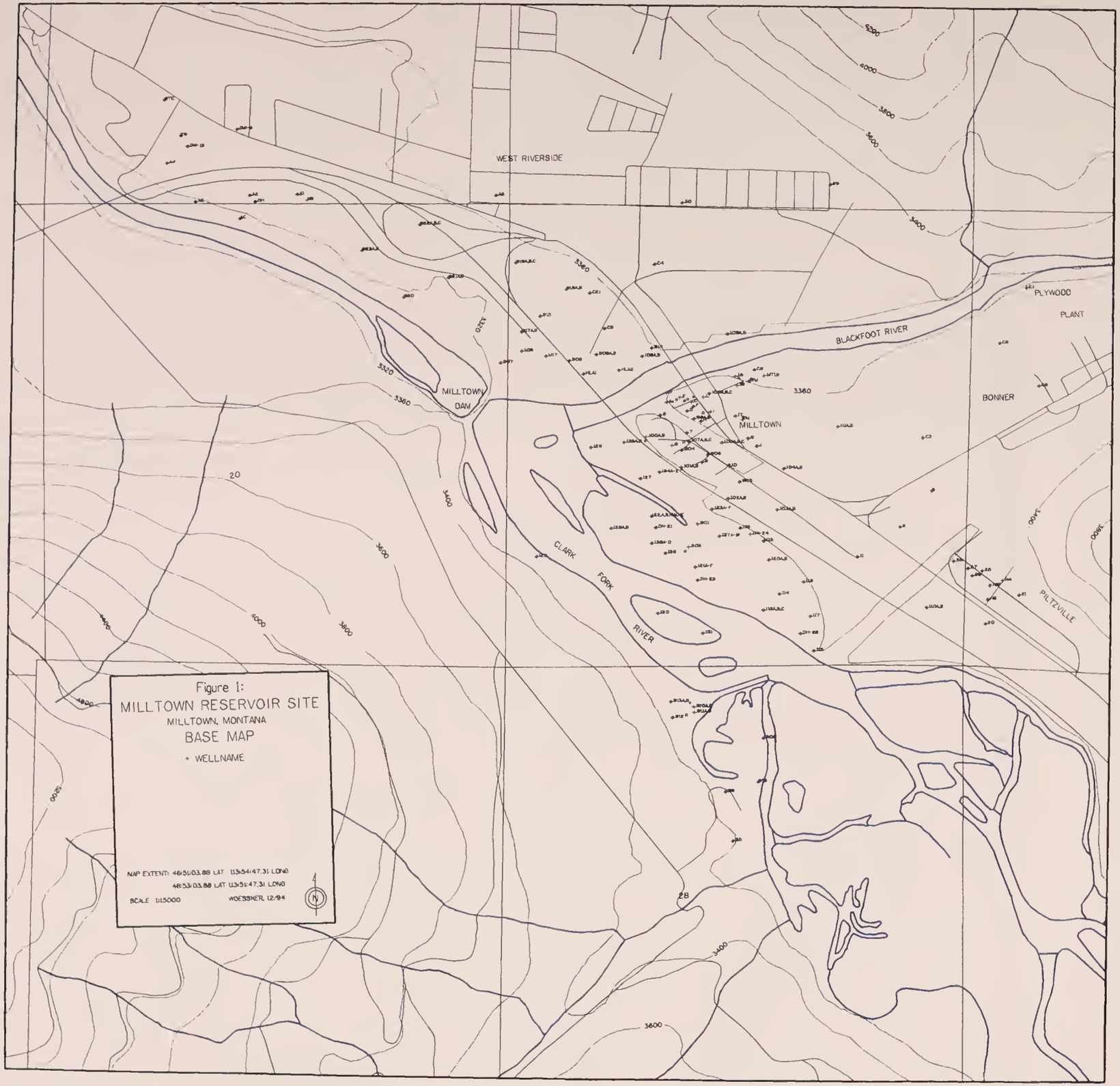
Surface Water Hydrology

The principal surface water feature in the area is the Milltown Reservoir located upstream of Milltown. It is formed behind Milltown Dam, constructed in 1907, at the confluence of the Clark Fork and Blackfoot rivers (Figure 1 and Plate 1). Milltown dam is the first dam on the Clark Fork River downstream from the Anaconda - Warm Springs area. The dam was damaged during flooding in the spring of 1908 and repaired. Discharge records for the Clark Fork River below the dam indicate that about 2.1 million acre feet of water flows over the dam annually; the Clark Fork River comprises 46% of the total flow.

The Blackfoot River has an average discharge of 1,658 cubic feet per second measured 8.1 mi north of Milltown. The average discharge of the Clark Fork River as it enters the reservoir, as estimated from the difference between the discharge records obtained for the Clark Fork River 2.8 mi below the dam, 3,015 cfs, and the Blackfoot River discharge, is 1,357 cubic feet per second (ENSR, 1992).

Geology

The mountains surrounding the valley floor are composed of Precambrian argillite, quartzite and limestone metasediments of the Belt Series (Figure 2). Structurally, the area is complex. The


WEST RIVERSIDE
PLYWOOD
PLANT
BLACKFOOT RIVER
MILLTOWN DAM
MILLTOWN
BONNER
CLARK FORK RIVER
PILTZVILLE
3320
3360
3400
3600
4000
4800
20
28
Figure 1:
MILLTOWN RESERVOIR SITE
MILLTOWN, MONTANA
BASE MAP
+ WELLNAME
MAP EXTENT: 46:51:03.88 LAT 113:54:47.31 LONG
46:53:03.88 LAT 113:51:47.31 LONG
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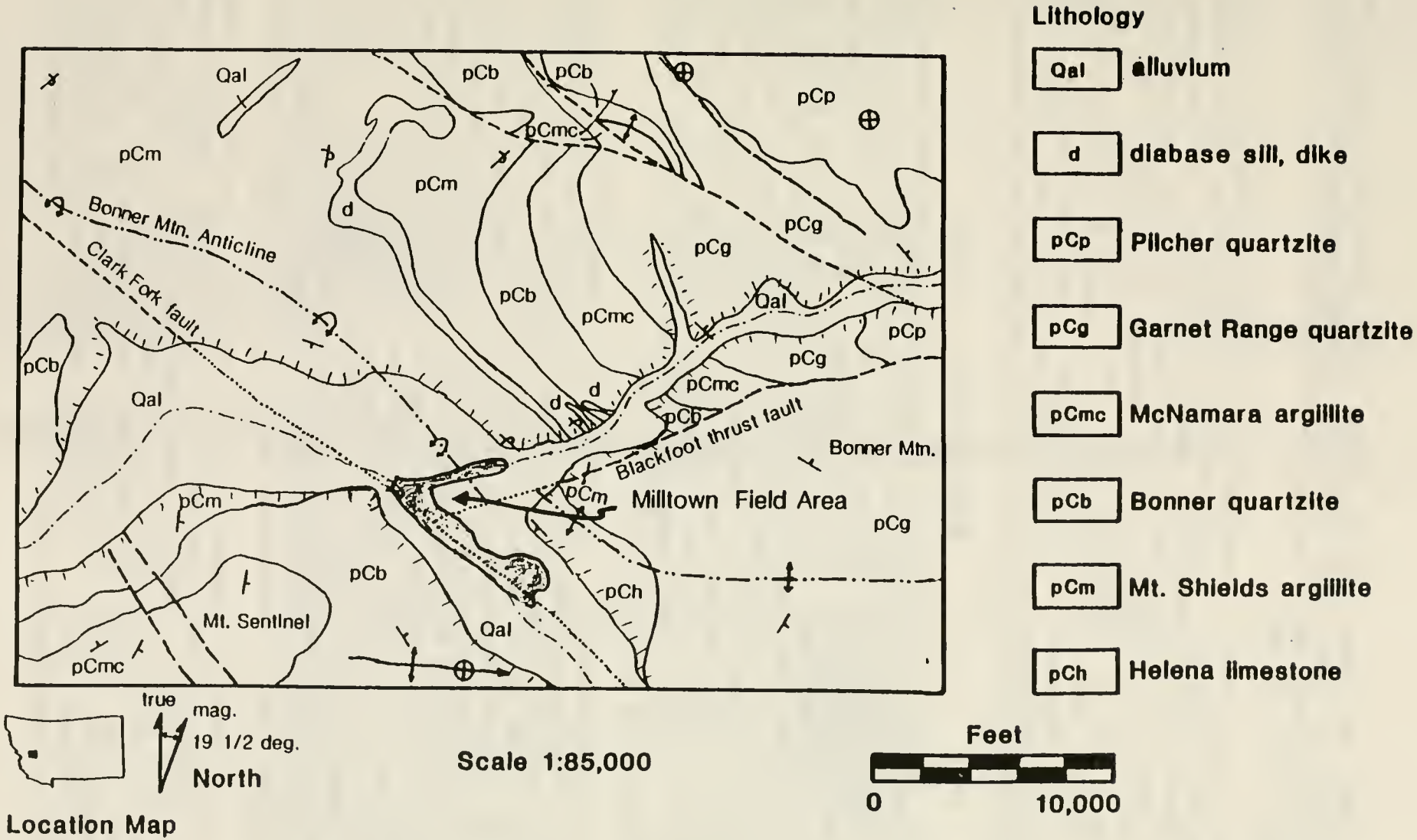


Figure 2: Geologic map of Milltown and vicinity. Milltown Resevoir is shaded and the channels of the Clark Fork and Blackfoot rivers located in Qal are represented by a dash dot pattern. The hatching indicates the boundary between bedrock and the Quaternary alluvium (Qal) (modified from Popoff, 1985).

rocks north and east of the Clark Fork River are folded and overturned. The Clark Fork shear zone is believed to be coincident with the Clark Fork River Valley and the Blackfoot thrust with the Blackfoot River Valley.

The valley floor is underlain by Quaternary alluvium (Qal) and Precambrian bedrock. Valley alluvium consists of inter-bedded sand, gravel and boulders with some clay lenses. Its thickness varies from 20 ft under the fine-grained reservoir sediments to over 150 ft in the vicinity of the plywood mill north of Milltown (Figures 3 and 4) (Schombel, per. com, 1994; Woessner, et al., 1994; Titan, 1994, see Appendix A). Bedrock underlying the alluvium is composed of metasediments of the Belt Series. The reservoir sediments are fine-grained sand, silt and clay approximately 29 ft thick near the dam and thinning up stream.

Hydrogeology

Groundwater is obtained from the alluvial material underlying the valley floor. The water table is at the surface in the sub-aerial reservoir sediments and 30 to 40 ft below land surface in the gravel underlying Milltown (Figures 3 and 4). Groundwater recharge is from direct precipitation, leakage from the reservoir, and by lateral flow from the mountain boundaries and the upstream valley alluvium of the Clark Fork and Blackfoot rivers. Generally, groundwater flows from the reservoir sediments to the northwest, parallel to the Clark Fork and Blackfoot rivers (Figure 5 and 6). The water table elevation typically varies up to five feet annually. Water table highs correlate with the period of spring runoff and lows with late winter (Figure 7).

Milltown Reservoir is hydrologically connected to the alluvial aquifer underlying Milltown. The water table in the reservoir sediment and the reservoir stage are typically 10 to 15 ft higher than the water table beneath Milltown (Figure 3 and Figure 7). Reservoir water saturates the exposed and submerged fine-grained reservoir sediments and this water flows towards Milltown by moving both northward and downward into the underlying coarse grained old floodplain gravel (Figure 8). Based on nested monitoring wells, Woessner et al. (1984) determined the distribution of vertical gradients in the reservoir sediments and the coarse material underlying Milltown (Figure 9). Vertical gradients are generally downward in the fine-grained reservoir sediments and near zero in the adjacent sand, gravel and cobble materials. This implies that groundwater flow in the coarse material is principally horizontal.

The hydraulic conductivity of the sand, gravel and cobble aquifer ranges widely from 190 ft/d for the finer fraction to over 59,000 ft/d for the cobble zones (Woessner et al., 1984). Large values of hydraulic conductivity typical of this area reflect the extreme high energy depositional environment of the valley sediments and are similar to values reported for the Missoula valley (Miller, 1991). Groundwater velocities within the gravel aquifer are estimated to range from 1.9 ft/d in finer units to over

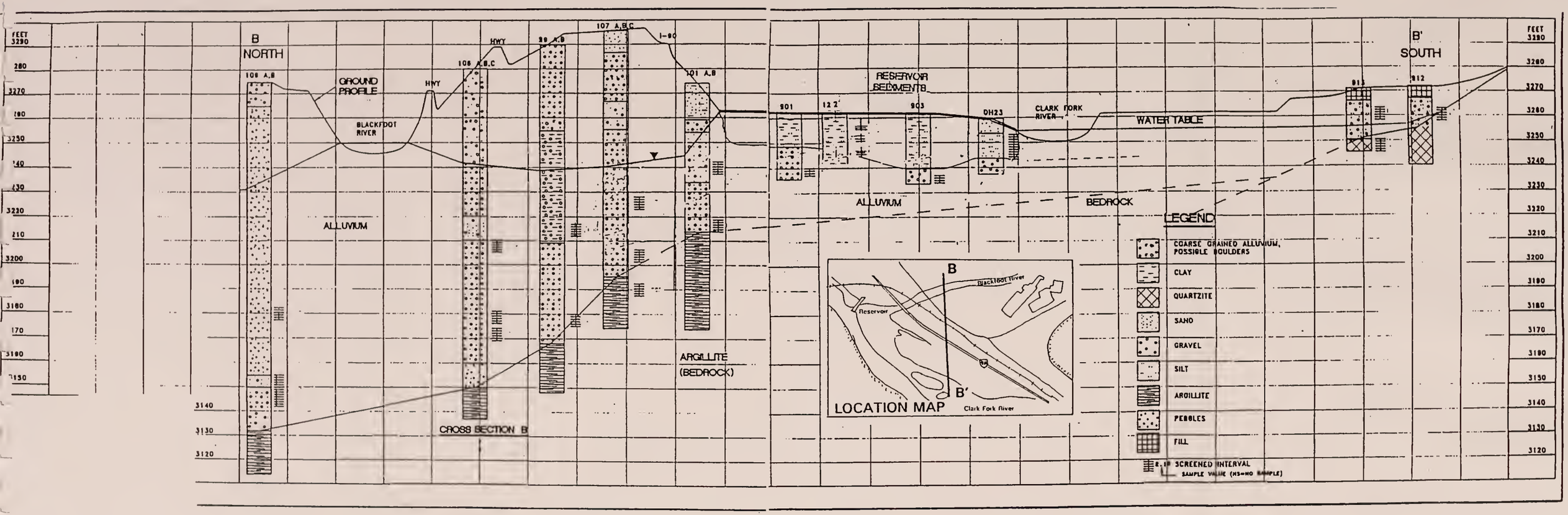
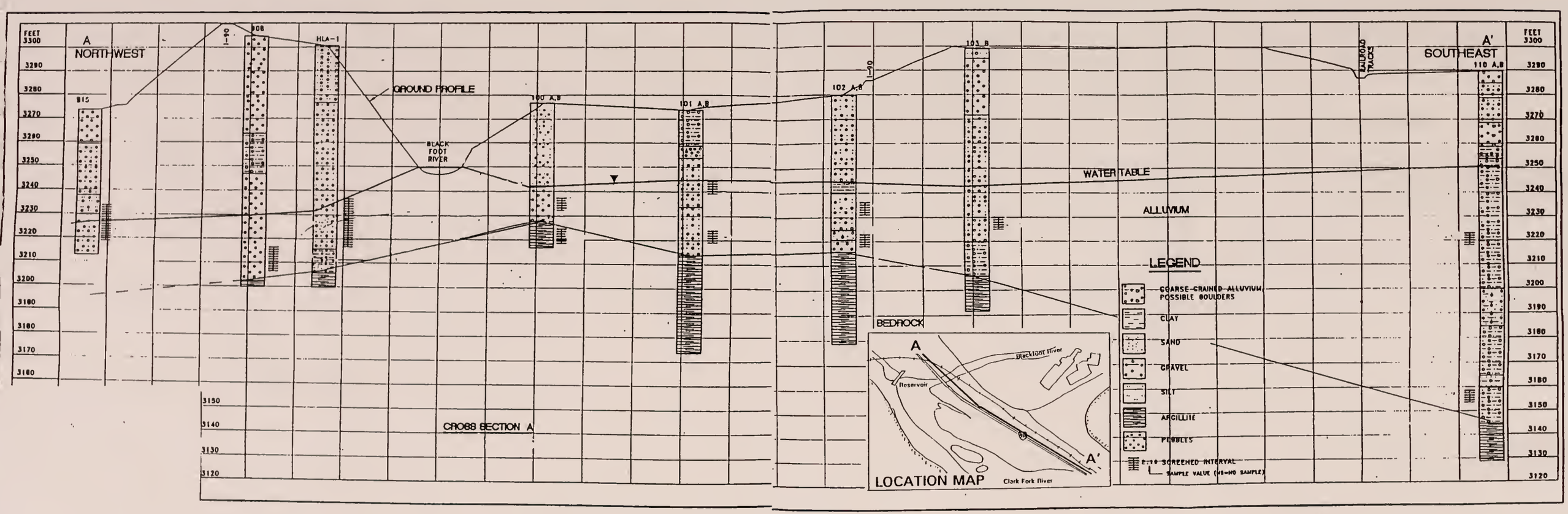


Figure 3: North-south cross section of Milltown area. Horizontal scale, 1"= 400'; vertical scale, 1"= 40' (after ENSR, 1991).



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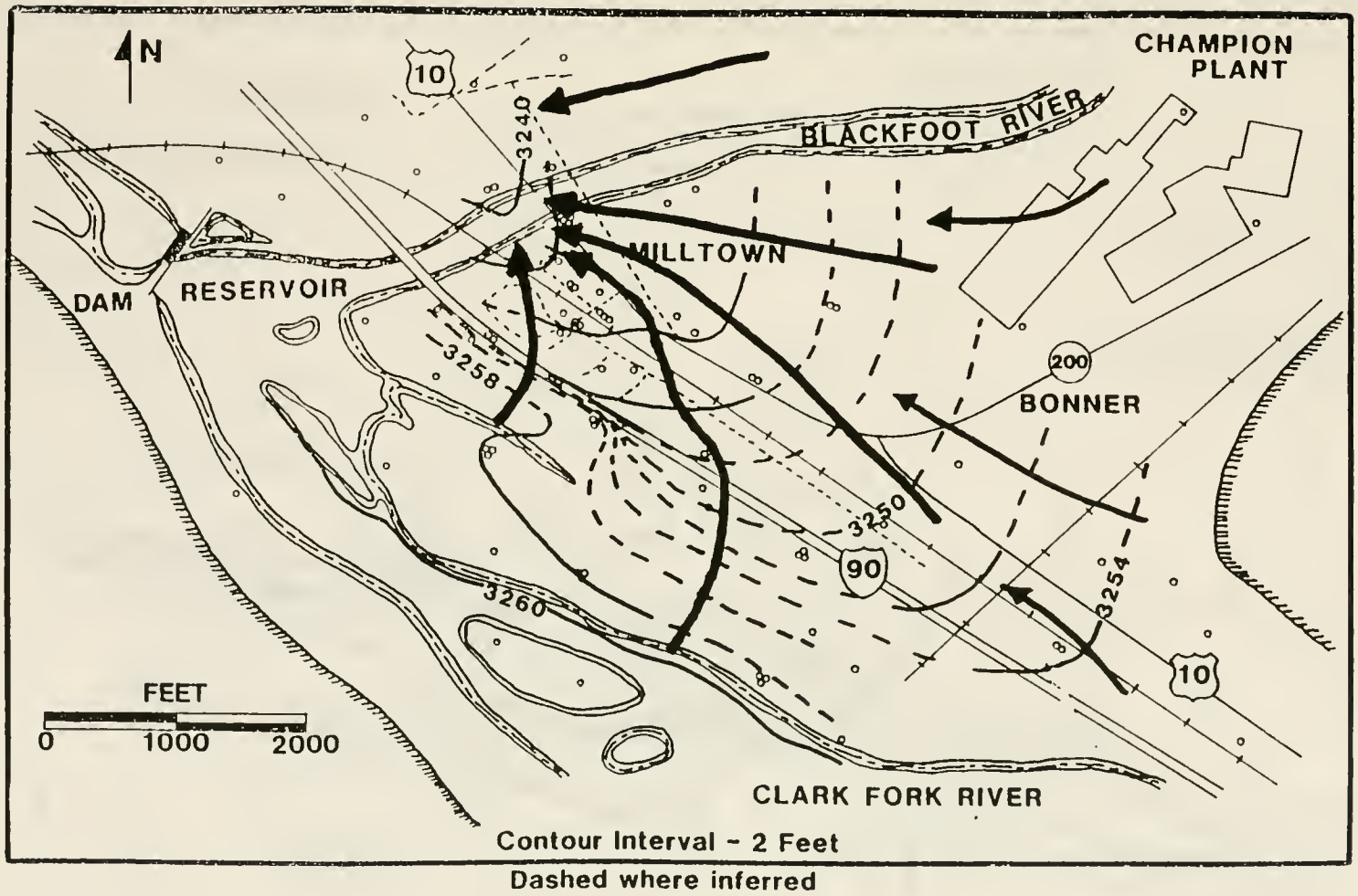

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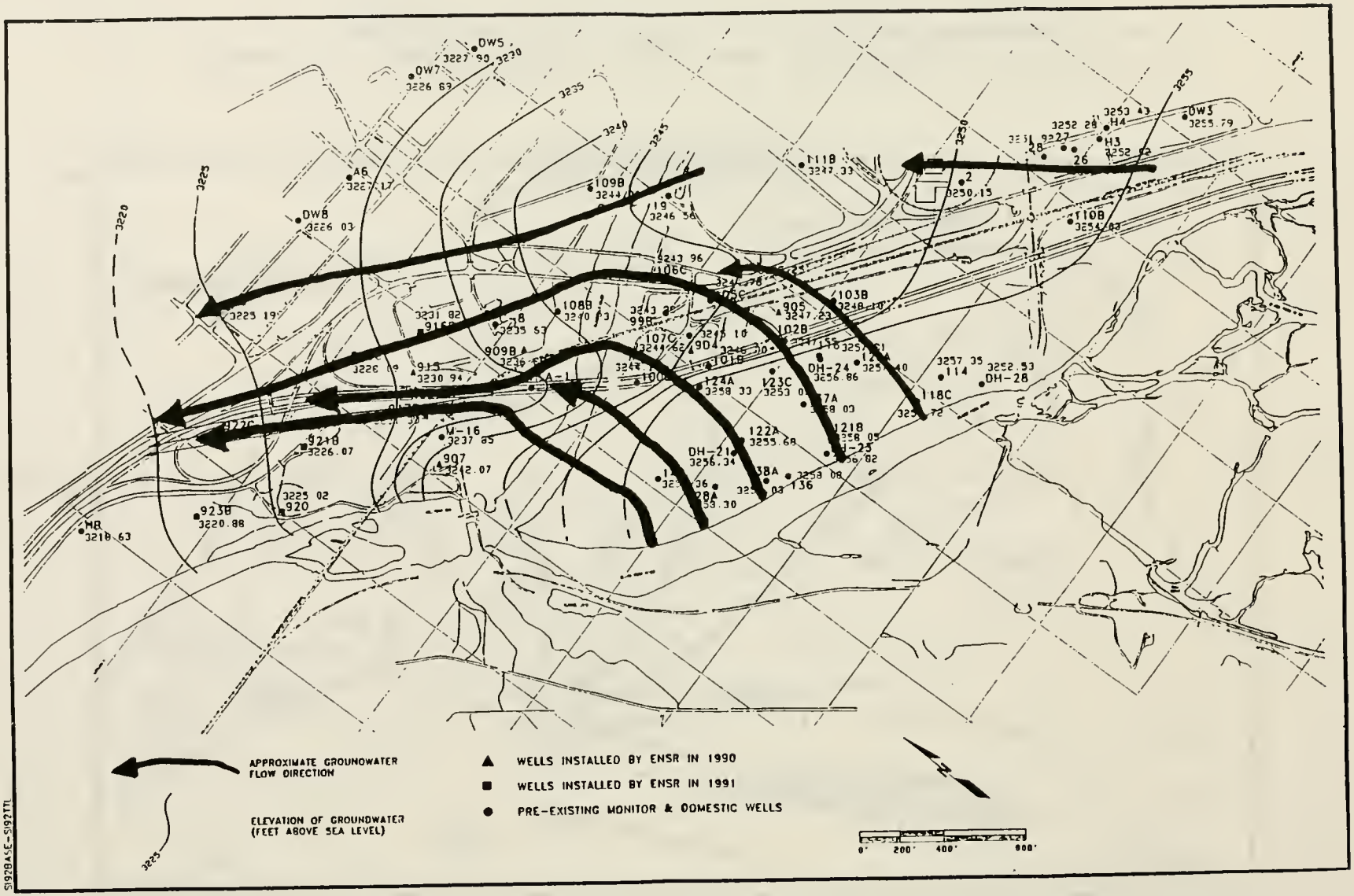

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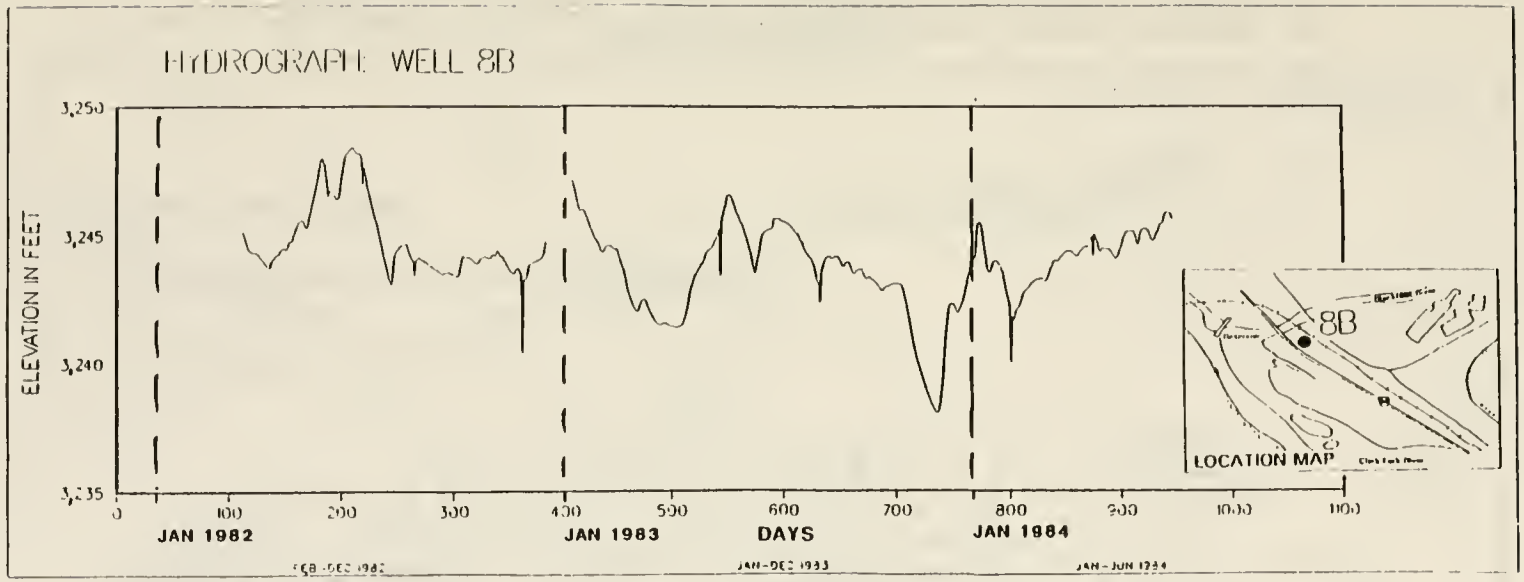


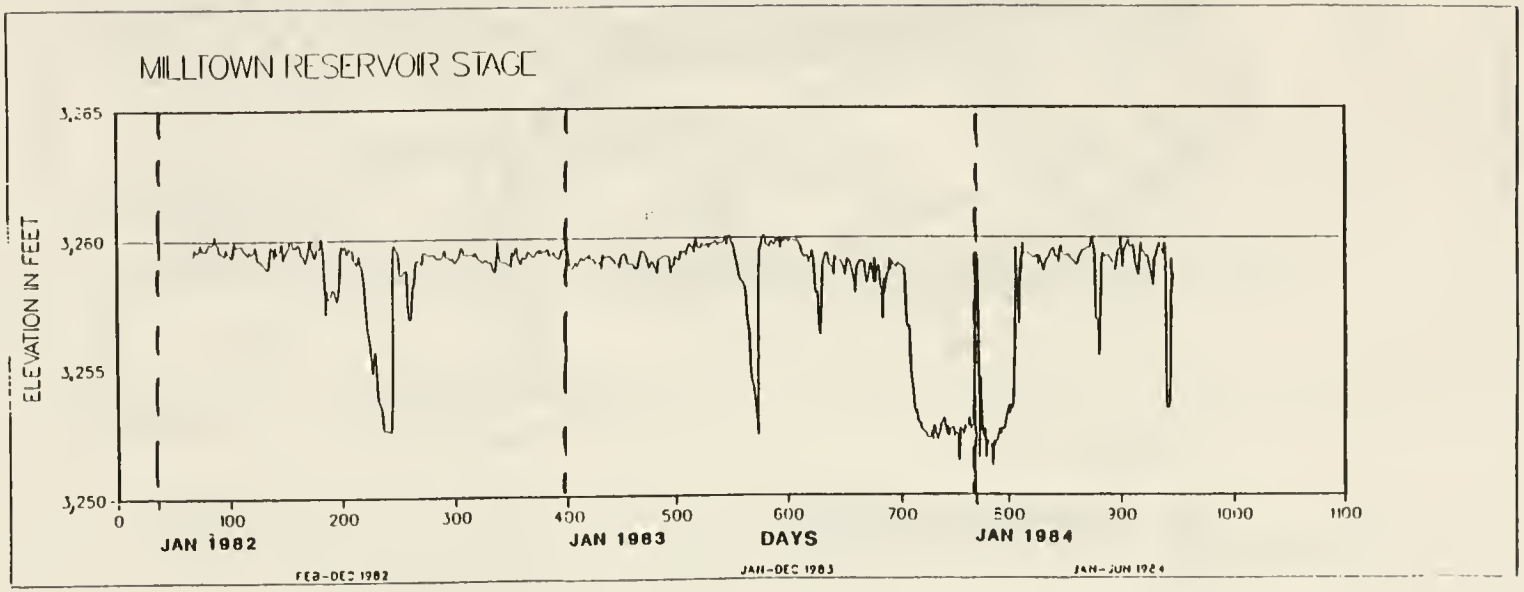


Figure 7: Hydrograph of well 8B and the Milltown Reservoir stage between March, 1982, and June, 1984 (after Woessner et al, 1984).

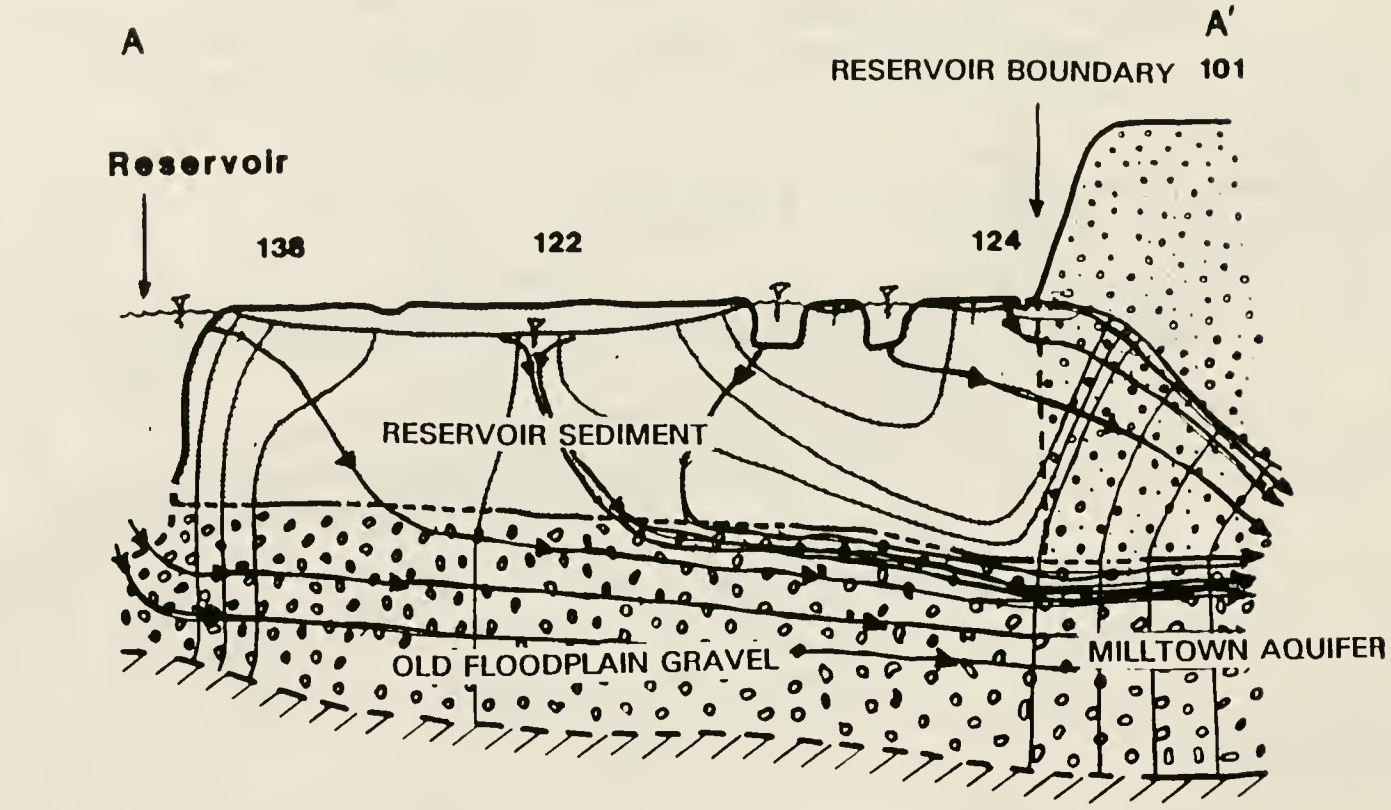


Figure 8: Schematic cross section showing the relationship of groundwater flow in the reservoir sediments with the underlying floodplain sediments and Milltown Aquifer. Numbers 138, 122, 124 and 101 represent well locations (modified from Udaloy, 1988).

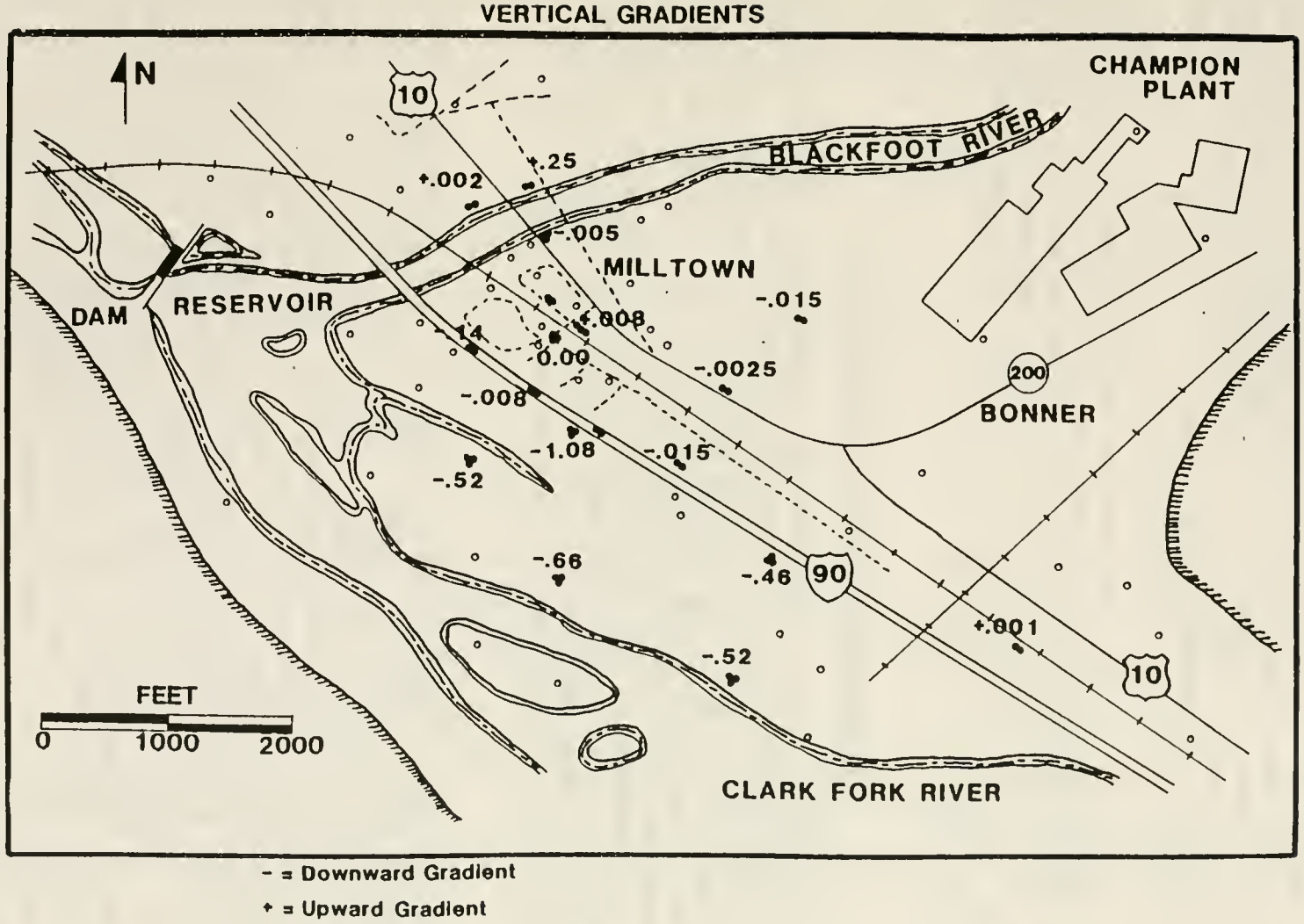


Figure 9: Distribution of vertical gradients (ft/ft) (Woessner et al., 1984).

400 ft/d in extremely coarse-grained material (Woessner, et al., 1984). Udaloy (1988) and Hydrometrics (1985) reported a range of hydraulic conductivity of the fine-grained reservoir sediments of 0.2 to 17 ft/d. The average hydraulic conductivity is estimated to be 5.5 ft/d. Assuming an average vertical gradient of 0.382 (based on Udaloy's September, 1986, data), and a range of porosity of 0.30 to 0.40, vertical groundwater velocities in the reservoir sediment average five to seven feet per day.

The groundwater in the coarse alluvium and fine-grained reservoir sediments, and the waters of the Clark Fork River and Blackfoot River are calcium bicarbonate types as shown by the Stiff diagrams in Figure 10. The water in the bedrock is typically higher in and often dominated by sodium and bicarbonate ions (i.e., wells 107B, 7, 101A, 103A).

GROUNDWATER INJURY DETERMINATION

In November, 1981, The Montana Department of Health and Environmental Sciences determined that four community wells in Milltown, Montana, contained groundwater with arsenic levels that ranged from 0.22 to 0.51 mg/l (220 to 510 ug/l)(Figure 11). The groundwater from these wells also contained high concentrations of iron, manganese and total dissolved solids (). An investigation in 1984 by Woessner et al. concluded that contaminated reservoir sediments containing mining and smelting wastes were the source of the arsenic, iron, manganese and found in these wells. A description of the source of contamination follows.

Source

Woessner and Popoff (1982) proposed four possible sources responsible for arsenic, metal and contamination of the groundwater in the Milltown area: 1) a wood products mill; 2) an abandoned industrial and municipal dump; 3) the adjacent reservoir sediments which contained mining and smelting wastes; 4) a deeper groundwater bedrock system (Figure 11). A subsequent groundwater investigation concluded that the source of arsenic, metals and contaminating groundwater found underlying the southern portion of Milltown was fine-grained sediment trapped behind Milltown Dam (Woessner et al., 1984). The principal data supporting this conclusion were: 1) the presence large volumes of arsenic and metal contaminated sediments found in Milltown Reservoir; 2) the presence of hydraulic gradients that direct groundwater movement from the reservoir sediments to the adjacent contaminated wells; 3) the fact that arsenic and other metal concentrations are highest in the reservoir groundwater and decrease in concentration towards the affected wells. Since the 1984 study, four additional analyses of the original report and additional field work have been conducted as part of the CERCLA process. Each work supported the original conclusions of Woessner et al. (1984) (Hydrometrics, 1985; HLA, 1986; ENSR, 1991 and 1992). Further research by Moore et

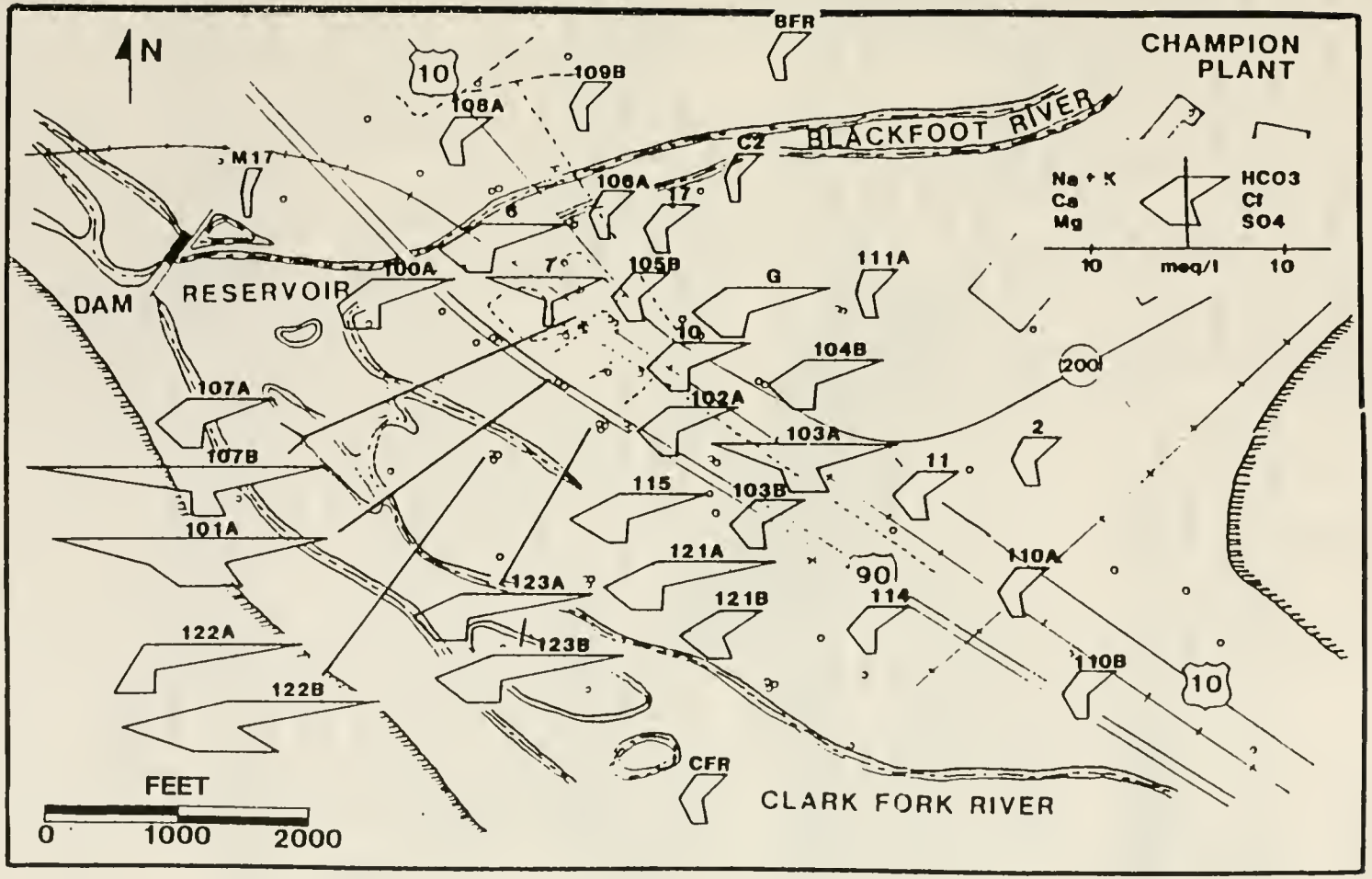


Figure 10: Stiff diagrams of the groundwater quality (i.e., 122A) and the surface water quality, Clark Fork River (CFR) and Blackfoot River (BFR)(after Woessner et al, 1984).

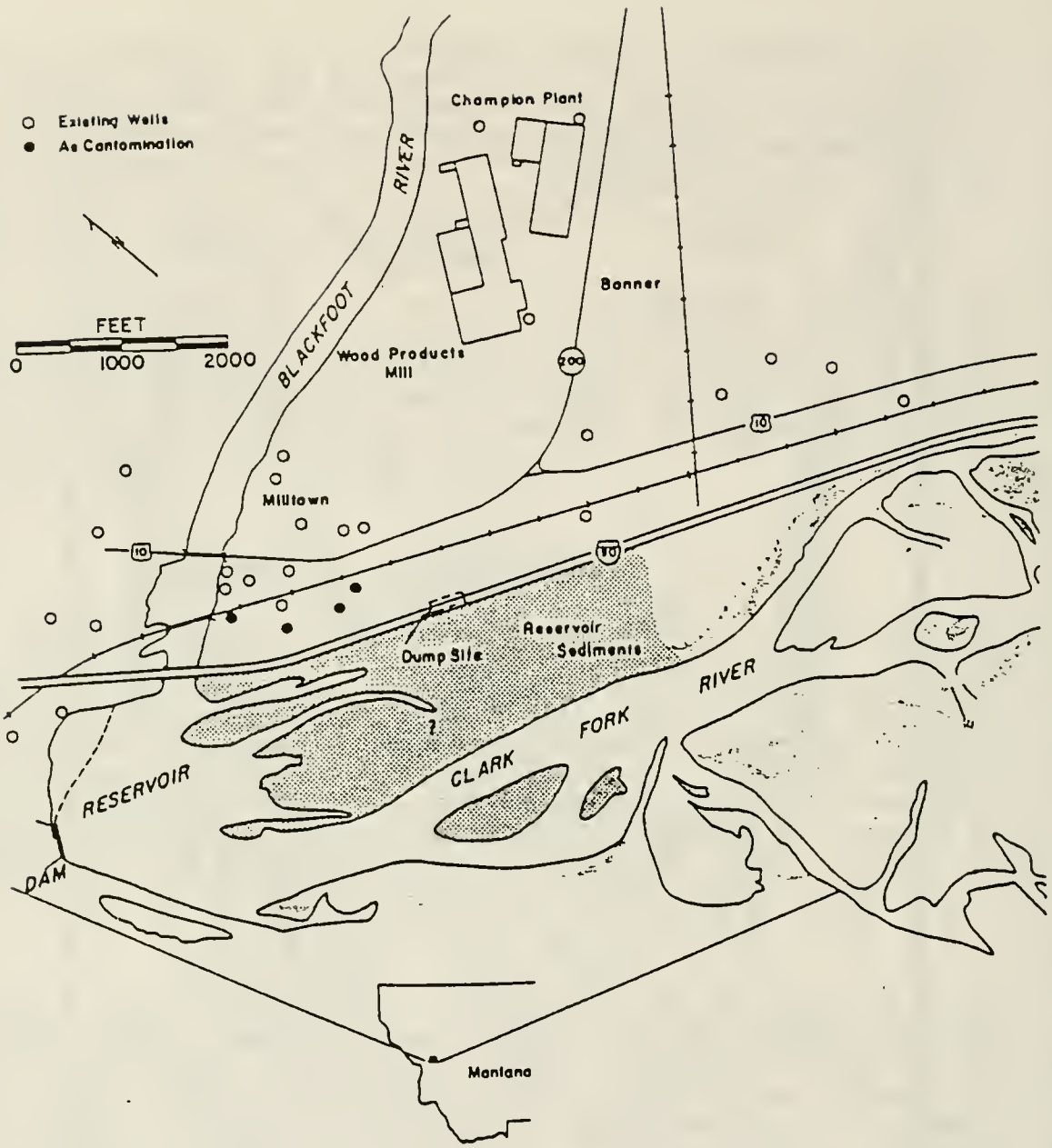


Figure 11: Location map of the Milltown Reservoir and surrounding area. Four wells serving 34 households were discovered to be contaminated with arsenic in 1981 (solid dots). The shaded area represents exposed fine-grained reservoir sediments that have accumulated behind Milltown Dam and filled in the reservoir pool.

al.(1988), Udaloy (1988), Moore (1993), ENSR (1992) and Titan (1994) suggest a geochemical mechanism for release of the metals which fit with original interpretations.

Identity of Contaminants

Groundwater in the reservoir sediments and underlying and adjacent alluvial aquifer is contaminated with arsenic, iron, manganese and at levels that exceed drinking water standards. These contaminants were released from metal rich reservoir sediments via geochemical processes and have migrated in the saturated zone to water supply wells in Milltown (Figure 11). A description of the nature of the reservoir sediment source follows.

Since 1908, portions of bedload and suspended load of the upper Blackfoot and Clark Fork rivers previously transported westward to the Columbia River have been impounded by the Milltown Reservoir. These sediments have nearly filled the reservoir (Figure 11). Bedload sediment continues to accumulate whereas most present day suspended load is probably only temporarily stored in the system (Woessner et al., 1984; ENSR, 1992; Titan, 1994). Milltown Dam is approximately 30 ft high and creates a pool about 29 ft deep at dam. It is estimated that over 170 million cubic feet of fine grained sediment are trapped behind the dam (HLA, 1987).

It appears the majority of the reservoir sediments have originated from the Clark Fork River watershed and they contain arsenic and metals originating from upstream mining and smelting operations centered in Anaconda and Butte. Grab sampling and coring of the reservoir sediments by researchers and consultants confirm the presence of metals (Bailey, 1976; Bailey and Weisel, 1976; Woessner et al., 1984; Hydrometrics, 1985; HLA, 1986; Moore et al., 1988; Udaloy, 1988; ENSR, 1991 and 1992). Researchers have found it difficult to obtain detailed descriptions of the sediment stratigraphy, and contaminant distribution and quantity because the riverine-reservoir depositional environment has created a complex stratigraphy. Deposits of clay, silt and sand are discontinuous and interfinger. Attempts to describe the reservoir stratigraphy have relied upon interpretation of surface grab samples and sediment cores of varying lengths and quality (Figure 12). Woessner et al. (1984) illustrate the complex stratigraphy in the upper six feet (180 cm) of the reservoir sediment and the difficulty in correlating layers (Figure 13).

In 1992, ENSR used electronic cone penetrometer sampling at 67 sites to determine the stratigraphy of the fine grained reservoir sediments and the total sediment thickness in a portion of the reservoir (Figure 14). Based on results of this work, ENSR (1992) inferred the stratigraphy and thickness of the reservoir sediments as illustrated in the cross sections presented in Figures 15 and 16. The sediments are dominated in this area by clayey silt with lenses of silty sand. Cone penetrometer data were combined with coring information and an isopach map of the fine-grained sediment

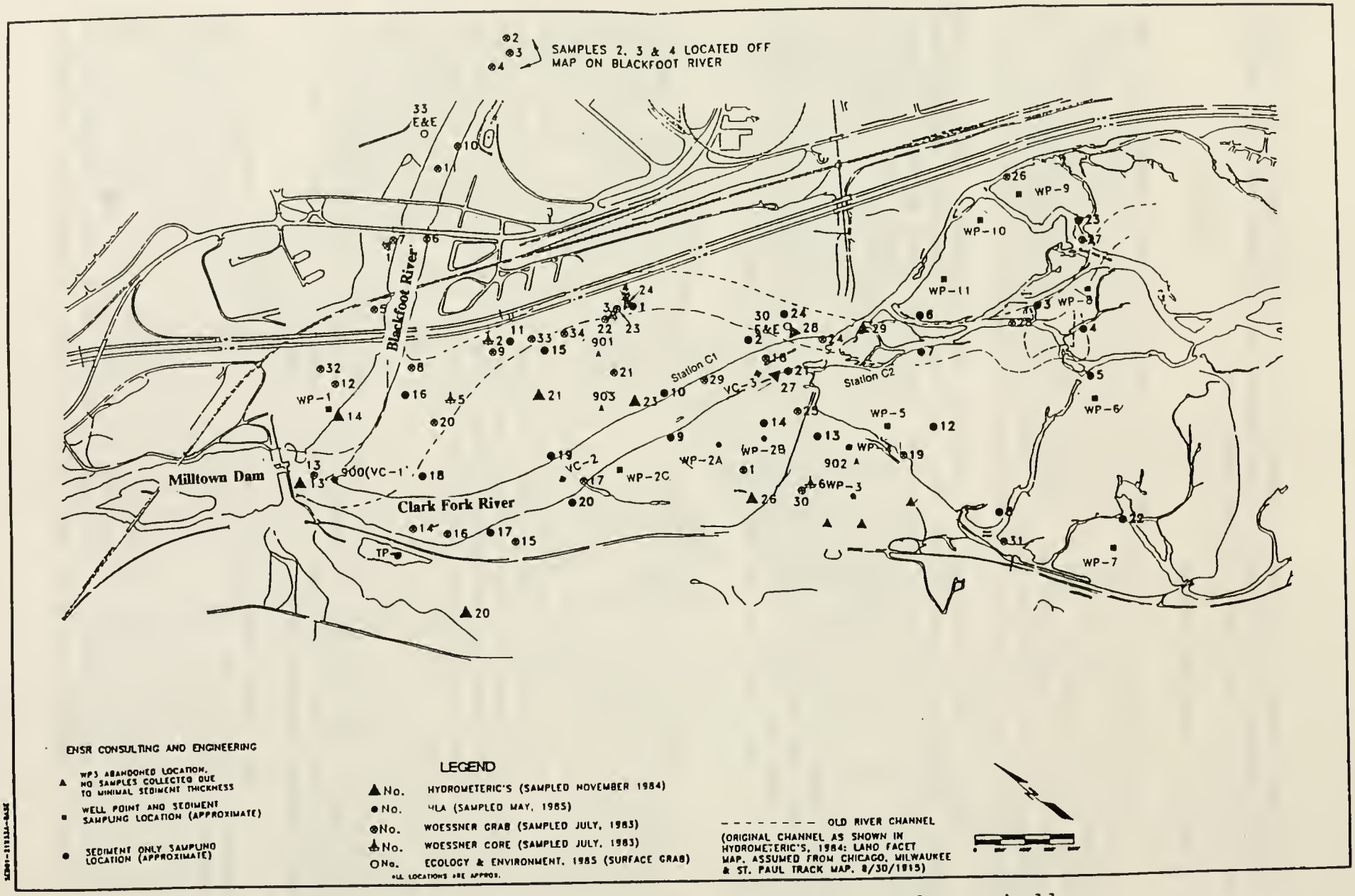


Figure 12: Location of surface sediment grab samples, shallow sediment samples and core samples collected by investigators at the Milltown Reservoir as summarized by ENSR (1992). Sample sites TP and Stations C1 and C2 were collected by ENSR (1992) (modified from ENSR, 1992).

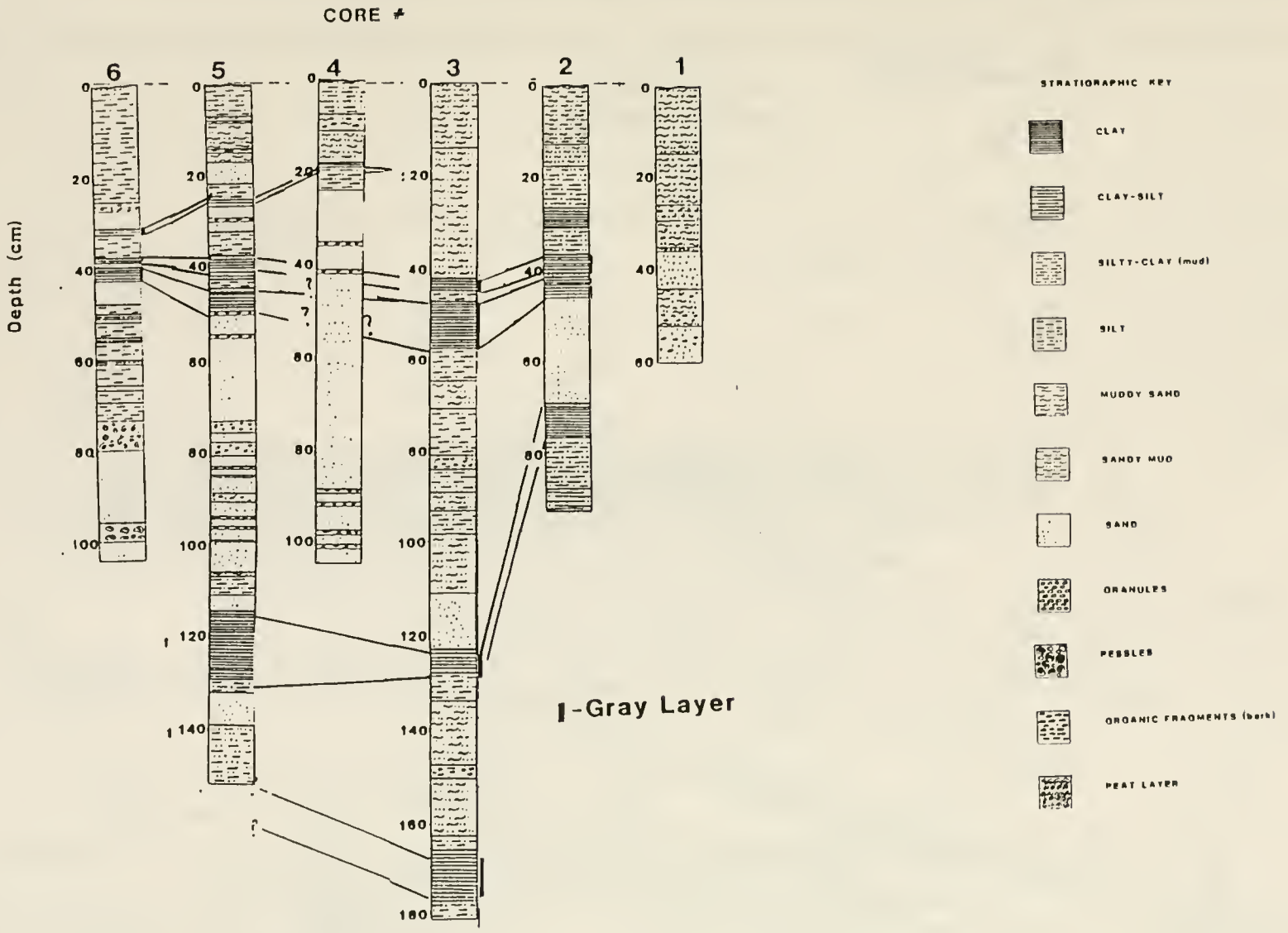


Figure 13: Stratigraphy of six cores collected by Woessner et al. (1984). Depth is in cm.

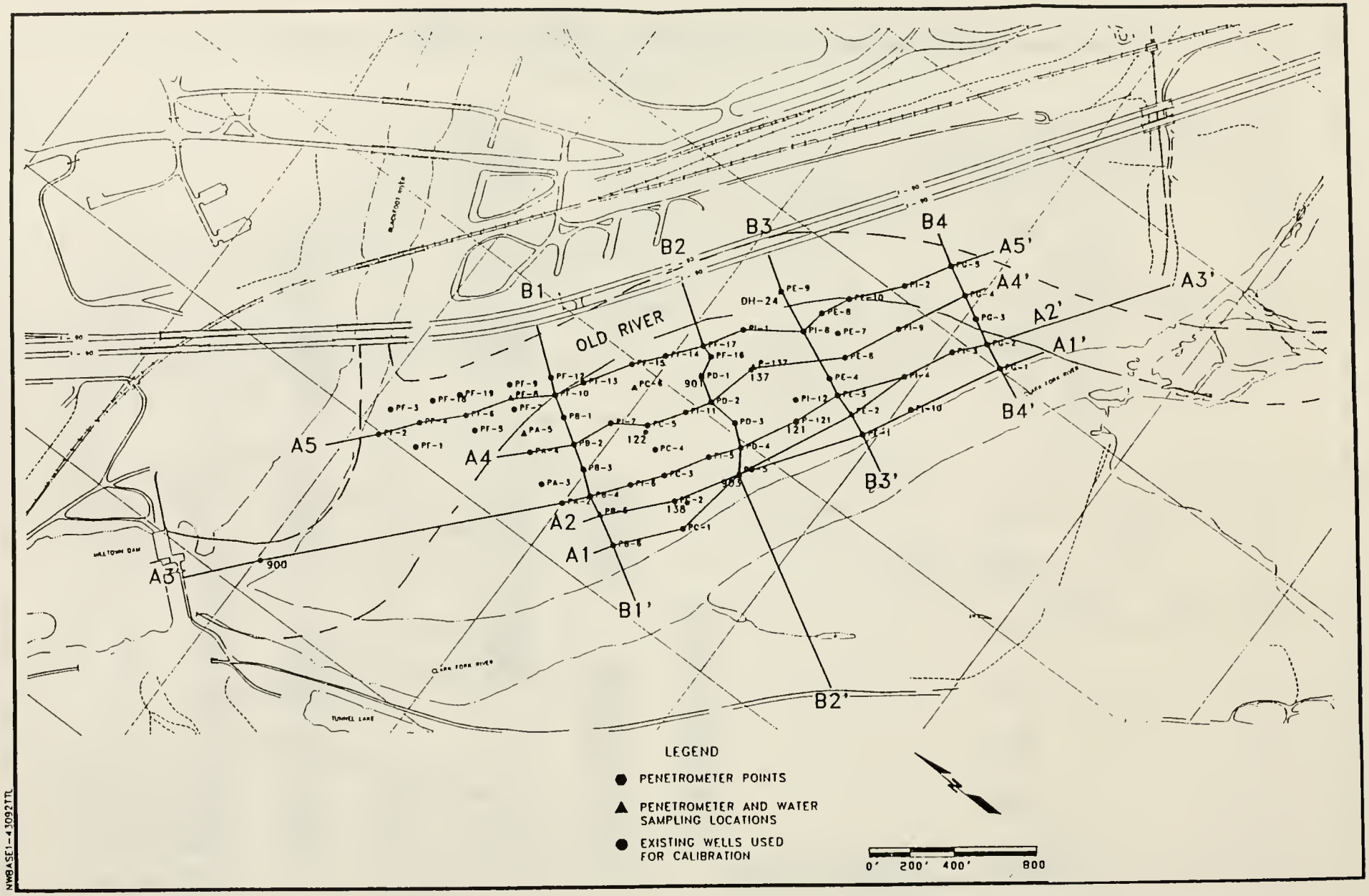


Figure 14: Location of transects and sampling points used during cone penetrometer testing of the reservoir sediments (ENSR, 1992).

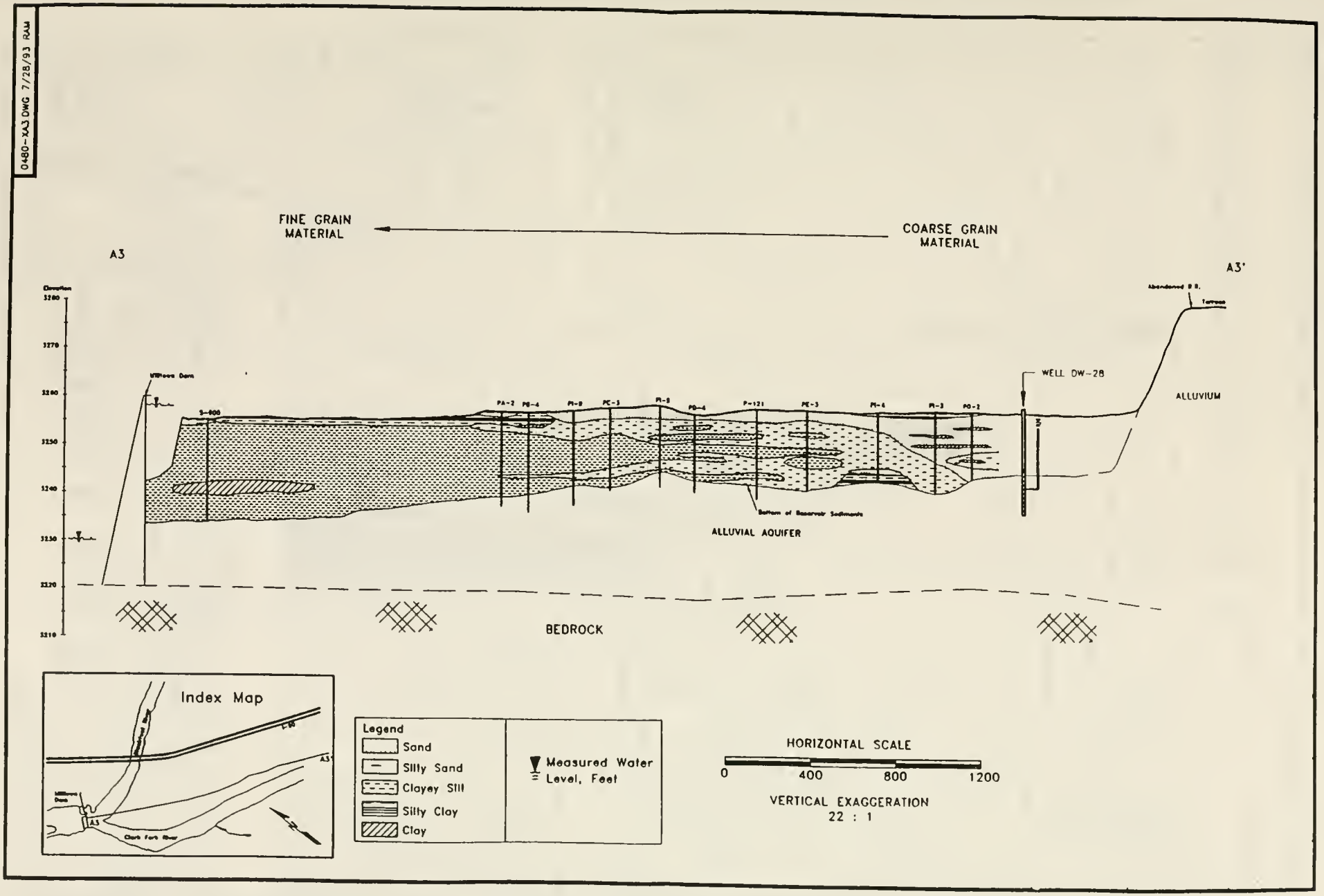


Figure 15: West-east stratigraphic section of the reservoir sediments inferred from cone penetrometer testing (ENSR, 1992, revised Titan, 1994).

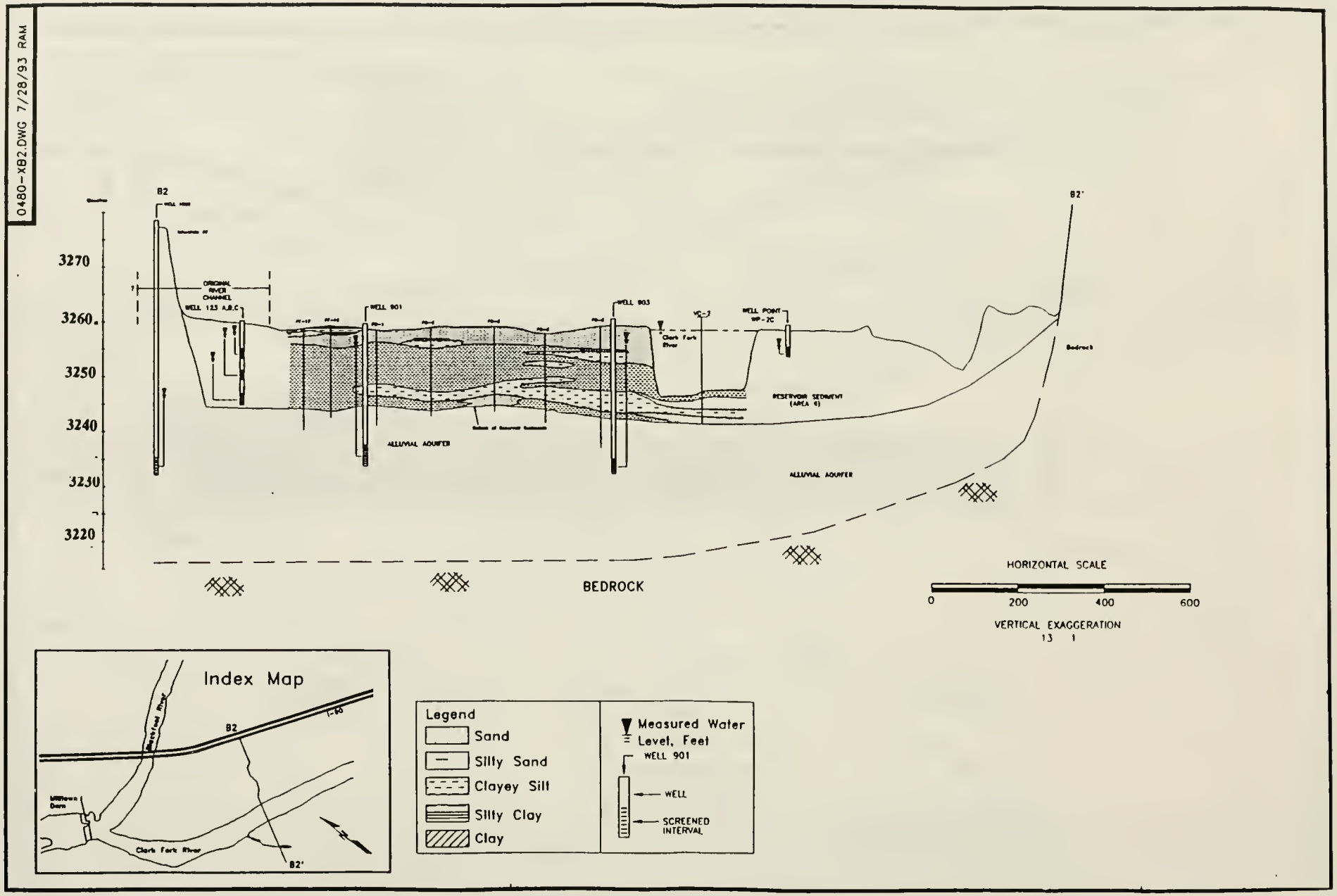


Figure 16: North-south stratigraphic section of the reservoir sediments inferred from cone penetrometer testing (ENSR, 1992, revised Titan, 1994).

was produced (Figure 17). Sediments are thickest in the western portion of the reservoir and thin to the east.

Sampling of the reservoir sediments to characterize the type and quantity of hazardous substances present has been attempted by six groups of researchers (Tables 1 and 2). Sediment chemistry characterization over the last 18 years has been accomplished using a number of extraction and digestion techniques as referenced in Tables 1 and 2. The most common analyses have attempted to characterize the total arsenic and metals present in a sample of dry sediment. Results of analyses performed on core samples of the fine grained reservoir sediments show hazardous substances in the reservoir sediments vary both horizontally and vertically. HLA (1987) provides a representation of the horizontal and vertical distribution of the concentrations of total arsenic, copper, iron, manganese, zinc, lead and barium in the reservoir sediments (Figures 18 to 24). These concentration values were determined from analysis of a hydrochloric/nitric acid-hydrogen peroxide digestion of dried sediment samples (HLA, 1987). Plots of the vertical distribution of total arsenic and selected metals from core samples at sites 901, 902 and 903 are presented in Figure 25 (ENSR, 1991). Generally, total organic carbon, iron and manganese appear to decrease in concentration within the first few feet of the surface, however, other trends are not clear. Figures 26 and 27 illustrate the variation in reservoir sediment arsenic and metal concentrations in three cores derived by using a sequential extraction (ENSR, 1991). Similar distributions of metals and arsenic in the Milltown reservoir sediments have been reported by other researchers (Bailey and Weisel, 1976; Woessner et al., 1984; Hydrometrics, 1985; HLA, 1986; Moore et al., 1988; Udaloy, 1988).

In an attempt to identify regions of the reservoir containing different levels of contamination, ENSR (1992) classified the reservoir into sediment accumulation areas (Figure 28). Based on this classification they compiled total arsenic and metal chemistry for the work of Woessner et al. (1984), HLA (1987) and ENSR (1992) (Table 3). Minimum, mean and maximum total arsenic and metal concentrations for reservoir sediment are presented in Table 4. Researchers have related finer grained sediment types with higher concentrations of various contaminants (Moore et al., 1988, Udaloy, 1988; ENSR, 1991). ENSR (1992) generalized their total arsenic and metals chemistry data by sediment type (Table 5). These data support the previously observed relationship of the presence of higher concentrations of hazardous substances with finer-grained sediments.

Though ENSR (1992) attempted to summarize and compile fine-grained sediment chemistry, especially for total arsenic, they did not produce an estimate of the total hazardous materials present in the reservoir sediment. HLA (1986) generalized their total sediment chemistry data by stating ranges and mean concentrations (Table 6). The large standard deviations illustrate the variability in concentrations at sample sites. When these concentrations are compared with the suggested background or

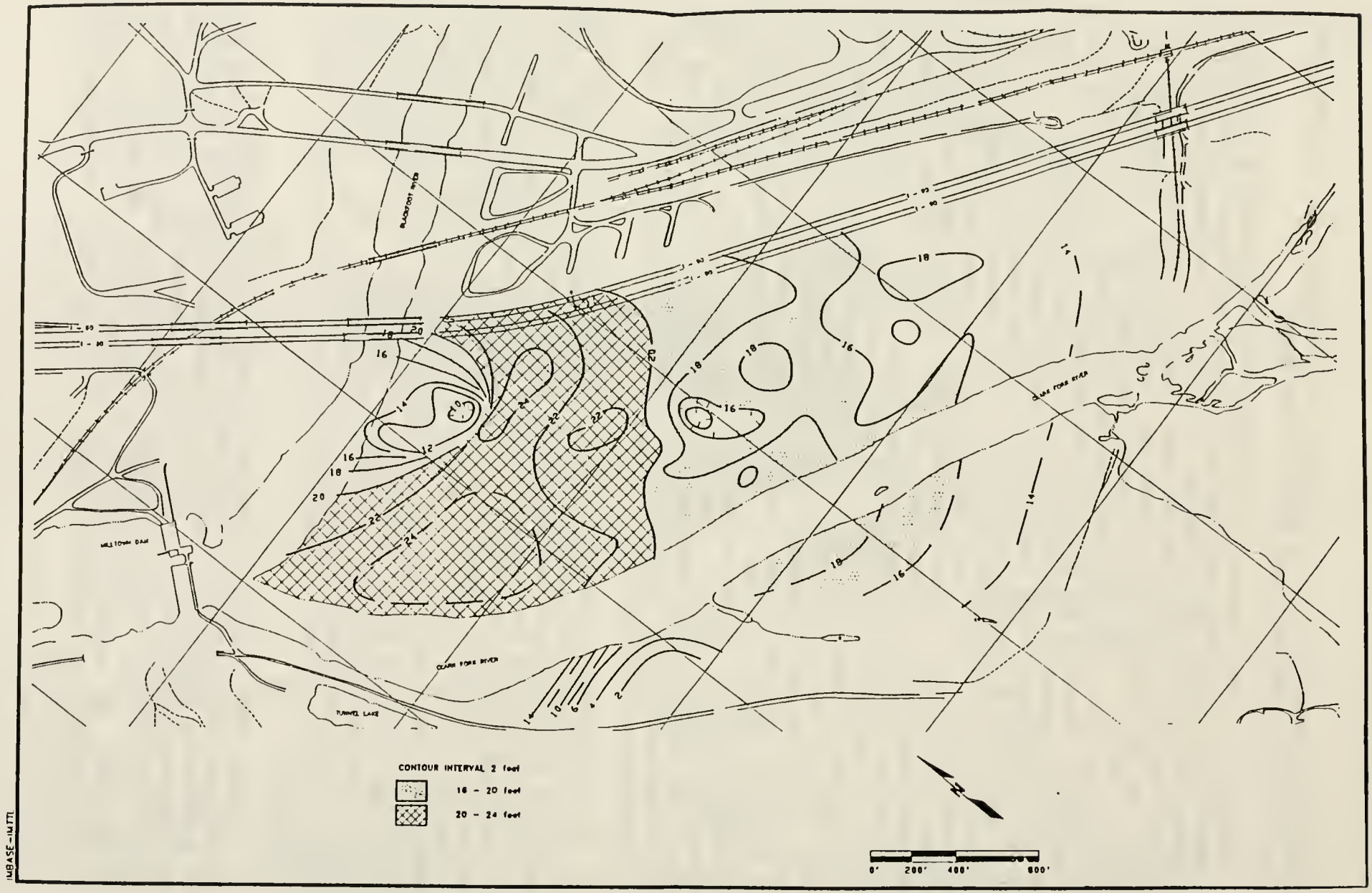


Figure 17: Isopach of the fine-grained reservoir sediments (ENSR, 1992).

TABLE 1: Research Groups, Number of Sampling Sites, Sampling Techniques, Analyses Performed and Sampling Location Descriptions for Fine-Grained Sediment Sampling at Milltown Reservoir (after ENSR, 1992).

Sampling Team (Affiliation end Sampling Date)	Number of Samples (not including QA/Qc)	Number of Sites	Sampling Technique	Analyses Performed	Sampling Location Description
Bailey and Wiesel (independent research July 1974)	57	7	Core samples (3.1 ft max. depth)	Total (HClo/HF/HNO_3/NC1 digestion) Cd, Cr, Cu, Fe, Mn, Zn	Core samples from within the reservoir and along the main channels of the Clark Fork and Blackfoot arms of the reservoir.
Woessner et al. (state of Montana contractor July 1983)	34	34	Surface-Peterson dredge grab samples	Total (lithium metaborate fusion digestion0 Fe, Zn, Mn. Total (aqua-regladigestion0 Pb, Cd, Cu, As. Recoverable (acetic acid digestion) As, Cd, Cu, Fe, Pb, Mn, Nl, Zn. Pore water extraction by centrifuging (same metals as acetic acid digestion). Particle size analyses and organic carbon.	Grab samples were collected from within the Milltown Reservoir In both the Clark Fork and Blackfoot arms of the reservoir.
	70	6	Core sample (5 ft max depth)	Same as grab samples above. Pore water extraction by N_2 displacement and prioritized as follows due to minimum sample volumes: As, Zn, Mn, Cu, Fe.	Same as above except samples consisted of core samples.
Ecology and Environment, John Moore (EPA contractors April 1985)	114	38	Surface grab samples	Total (HNO_3/N_2O_2 digestion0 and recoverable (acetic acid digestion) As, Co, Mn, Pb, Zn.	Grab samples form Flint Creek (tributary to the Clark Fork River), Cramer Creek., Little Blackfoot River, Warm Spring Creek. Brock Creek., Spring Creek, Douglas Creek, Boulder Creek, Willow Creek
Hydrometrics (Montana Power contractor November 1984)	36	10	Core samples (split spoon to approximately 30 ft)	Total (HNO_3/H_2O_2 digestion), EP toxicity and distilled water extractions for As, Ba, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Mo, Se, Ag, Zn.	Core samples from within the reservoir sediment and along former channels of the Clark Fork and Blackfoot Rivers.
Harding Lawson Associates (state of Montana contractor May 1985)	81	24	Core (tube sampler to 30 ft max.)	Total (aqua regia digestion) and EP toxicity extraction for As, Cu, Cd, Fe, Mn, Pb, Zn)	Selected samples from transects across the Clark Fork arm of Milltown Reservoir.

TABLE 2: ENSR Fine-Grained Sediment Sampling Program Sample Location, Date Sampled, Depth of Boring, Number of Samples, Sample Method and Analyses Requested (after ENSR, 1992).

Sample I.D.	Date Sampled	Depth of Boring (ft.)	Sample Depths (ft.)	Number of Samples	Sample Method	Analyses Requested
Sediment Areas I, III, and IV Core Samples						
900	9/27/90	22.9	Continuous	8	Hollow Stem Auger/Split Spoon	Total[1] and TCLP[2] Metals, TOC[3], grain size
901	9/25/90	26.0	Continuous	6	Hollow Stem Auger/Split Spoon	Total and TCLP Metals, TOC[3], grain size
902	9/28/90	15.2	Continuous	4	Hollow Stem Auger/Split Spoon	Total and TCLP Metals, TOC[3], grain size
903	9/22/90	27.3	Continuous	11	Hollow Stem Auger/Split Spoon	Total and TCLP Metals, TOC[3], grain size
VC-1	10/31/90	10.0	Continuous	4	Vibrocore	Total and TCLP Metals, TOC[3], grain size
VC-2	10/31/90	5.5	Continuous	4	Vibrocore	Total and TCLP Metals, TOC[3], grain size
VC-3	10/31/90	5.9	Continuous	4	Vibrocore	
Areas II, IV, and V Core Samples						
WP-1-SD	8/23/91	8.5	2.0 - 3.0 6.0 - 7.0	2	Hand Auger	Total metals, TOC, grain size
WP-2A-SD	8/23/91	4.5	2.5 - 4.0	1	Hand Auger	Total metals, TOC, grain size
WP-2B-SD	8/23/91	4.0	2.0 - 3.0	1	Hand Auger	Total metals, TOC, grain size
WP-2B-SD	8/23/91	3.0	2.0 - 3.0	1	Hand Auger	Total metals, TOC, grain size
WP-3-SD	8/22/91	1.7	0.7 - 1.7	1	Hand Auger	Total metals, TOC, grain size
WP-4-SD	8/22/91	9.5	2.5 - 3.5 8.0 - 9.0	2	Hand Auger	Total metals, TOC, grain size
WP-5-SD	8/22/91	12.0	2.5 - 3.5 7.0 - 8.0	2	Hand Auger	Total metals, TOC, grain size
WP-6-SD	8/22/91	5.5	1.5 - 2.0 4.5 - 5.0	2	Hand Auger	Total metals, TOC, grain size
WP-7-SD	8/23/91	3.5	2.0 - 3.0	1	Hand Auger	Total metals, TOC, grain size
WP-8-SD	8/21/91	4.0	3.0 - 4.0	1	Hand Auger	Total metals, TOC, grain size
WP-9-SD	8/20/91	5.5	2.5 - 3.0 5.0 - 5.5	2	Hand Auger	Total metals, TOC, grain size
WP-10-SD	8/21/91	7.5	2.0 - 3.0 6.5 - 7.5	2	Hand Auger	Total metals, TOC, grain size
WP-11-SD	8/21/91	12.5	5.0 - 5.5 10.5 - 12.5	2	Hand Auger	Total metals, TOC, grain size
Risk Assessment Surface Sediment Samples						
Station C1	6/5/92	0.75	0 - inch 9 inches	40	Stainless steel spade	Arsenic, cadmium, lead
Station C2	6/5/92	0.75	0 - inch 9 inches	12	Stainless steel spade	Arsenic, cadmium, lead
Station B2	6/5/92	0.75	0 - inch 9 inches	26	Stainless steel spade	Arsenic, cadmium, lead
Station C4	6/5/92	0.75	0 - inch 9 inches	9	Stainless steel spade	Arsenic, cadmium, lead
Tunnel Pond Surface Sediment Samples						
TP-1	10/3/90	10.0	0 - 1.4 1.4 - 2.8 2.8 - 4.2 4.2 - 5.6 5.6 - 7.2	5	Vibrocora	Total (plus Ag and Ni) and TCLP Metals, TPH[3], EOX[3], TOC, grain size
TP-2	11/2/90		1.5 - 2.6	1	Hand auger	Total (plus Ag and Ni) and TCLP Metals, TPH, EOX, TOC, grain size
TP-3	11/2/90		1.0 - 1.5	1	Shovel	Total (plus Ag and Ni) and TCLP Metals, TPH, EOX, TOC, grain size
TP-4	11/2/90		0.0 - 1.0	1	Shovel	Total (plus Ag and Ni) and TCLP Metals, TPH, EOX, TOC, grain size
TP-5	11/2/90		0.0 - 1.5	1	Shovel/hand auger	Total (plus Ag and Ni) and TCLP Metals, TPH, EOX, TOC, grain size
TP-6	11/2/90		1.5 - 2.0	1	Shovel/hand auger	Total (plus Ag and Ni) and TCLP Metals, TPH, EOX, TOC, grain size

[1]Total Metals include: As, Ba, Cu, Cd, Cr, Fe, Pb, Mn, and Zn.

[2]TCLP Metals include: Agn, Ba, Cd, Cr, Pb, Hg, Ag, Se

[3]EOX - Extractable organic halogens
TOC - Total organic carbon
TPH - Total petroleum hydrocarbon

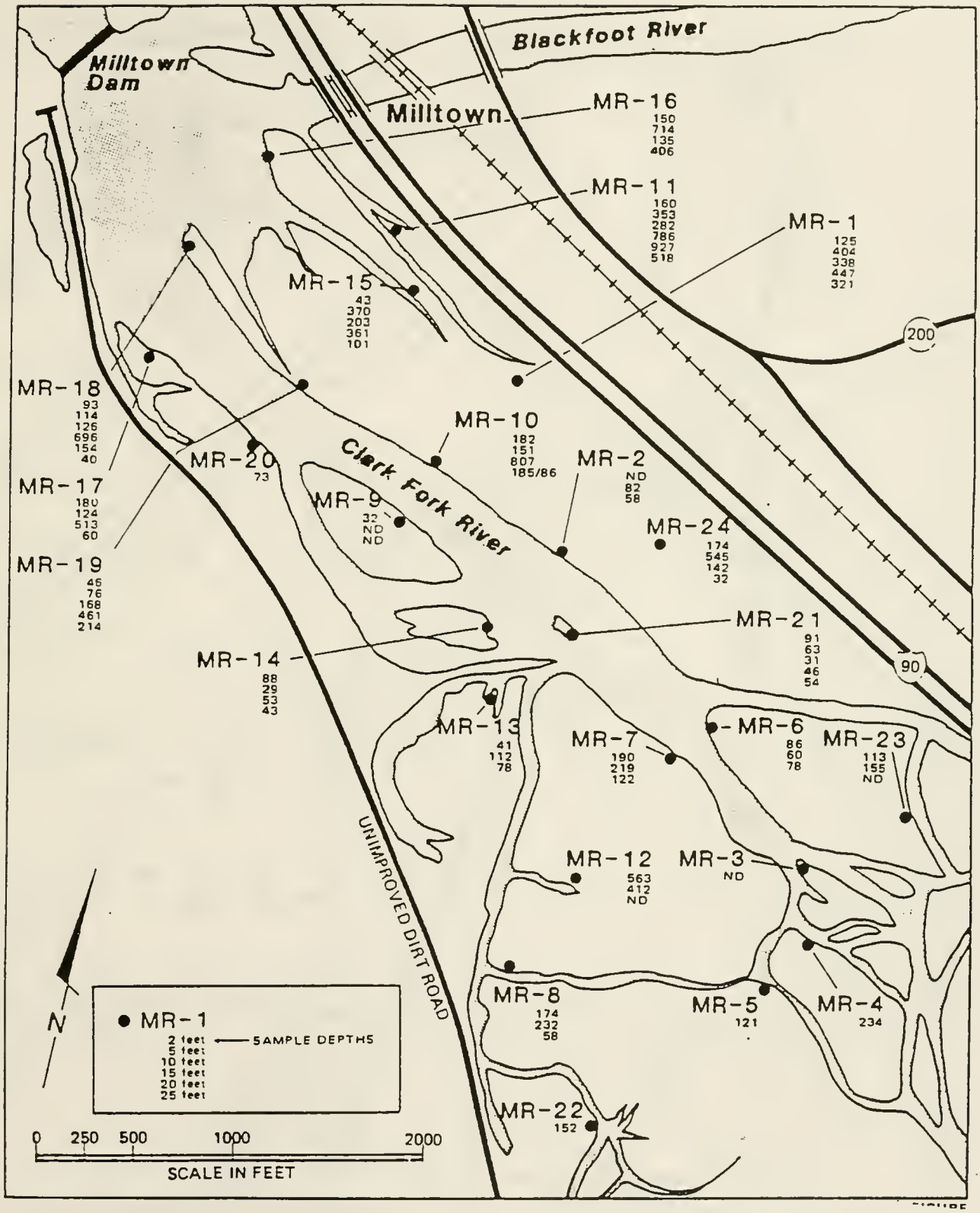


Figure 18: Area and vertical distribution of arsenic in subsurface sediments (mg/kg), Milltown Reservoir, Montana (HLA, 1987).

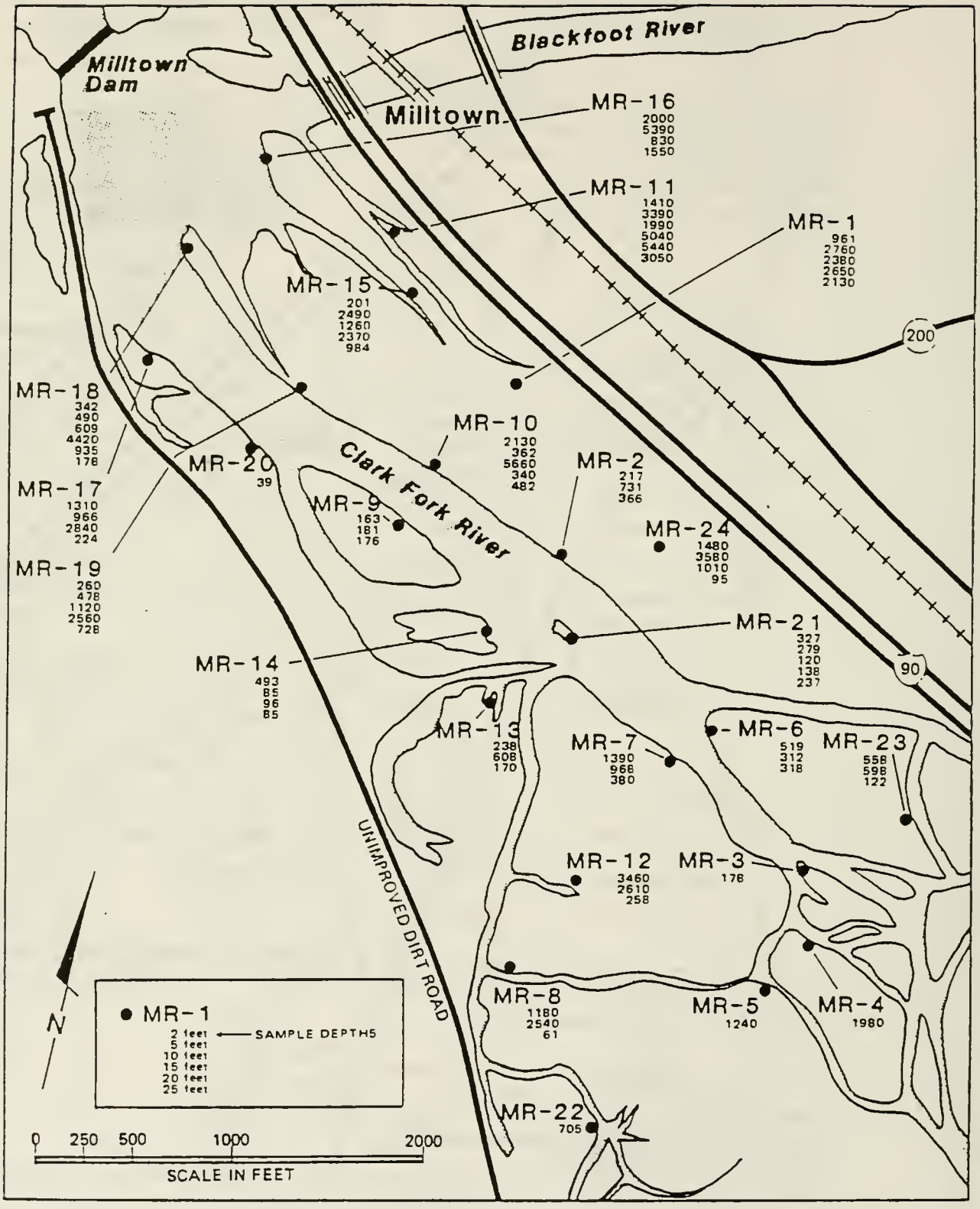


Figure 19: Area and vertical distribution of copper in subsurface sediments (mg/kg), Milltown Reservoir, Montana (HLA, 1987).

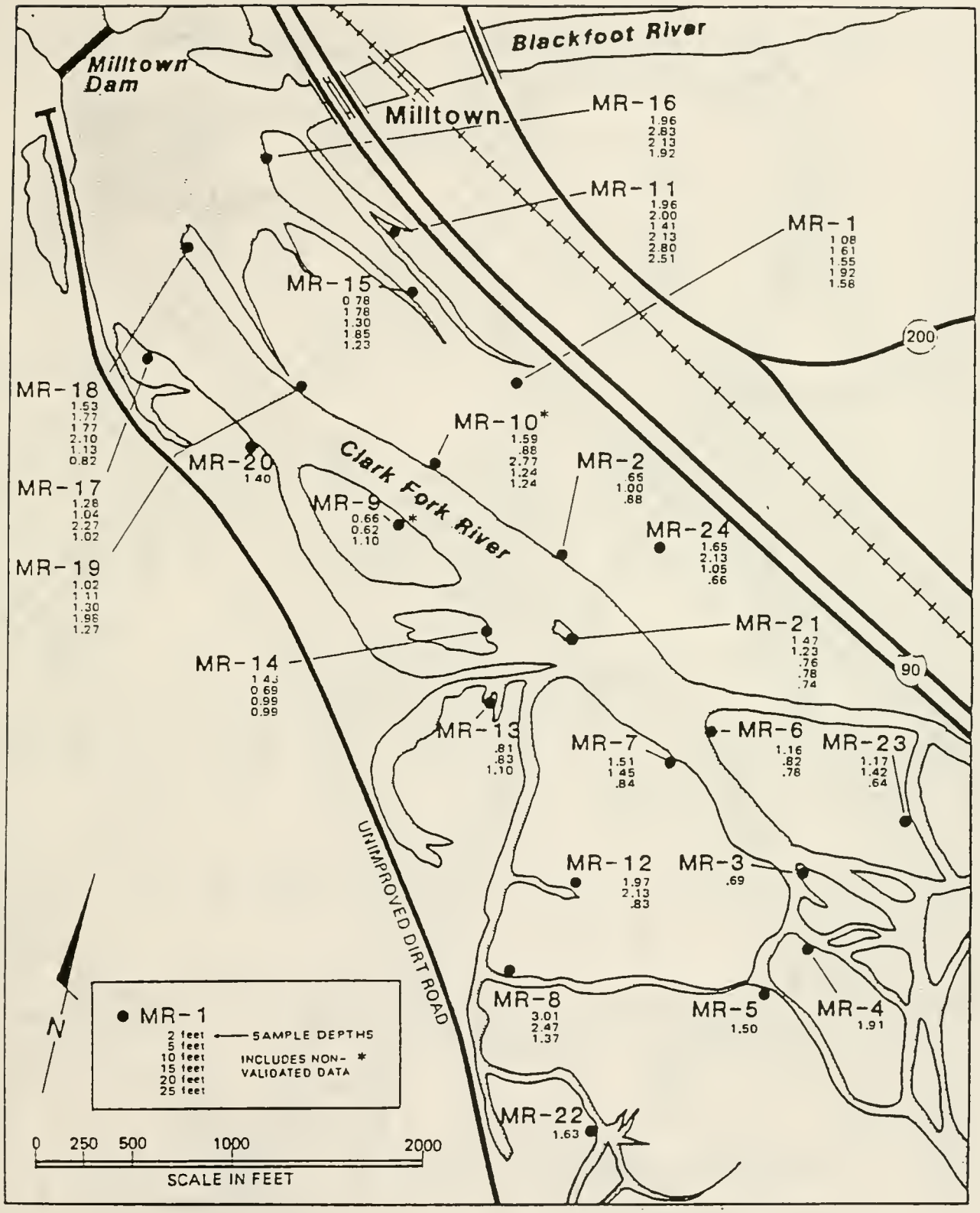


Figure 20: Area and vertical distribution of iron in subsurface sediments (%), Milltown Reservoir, Montana (HLA, 1987).

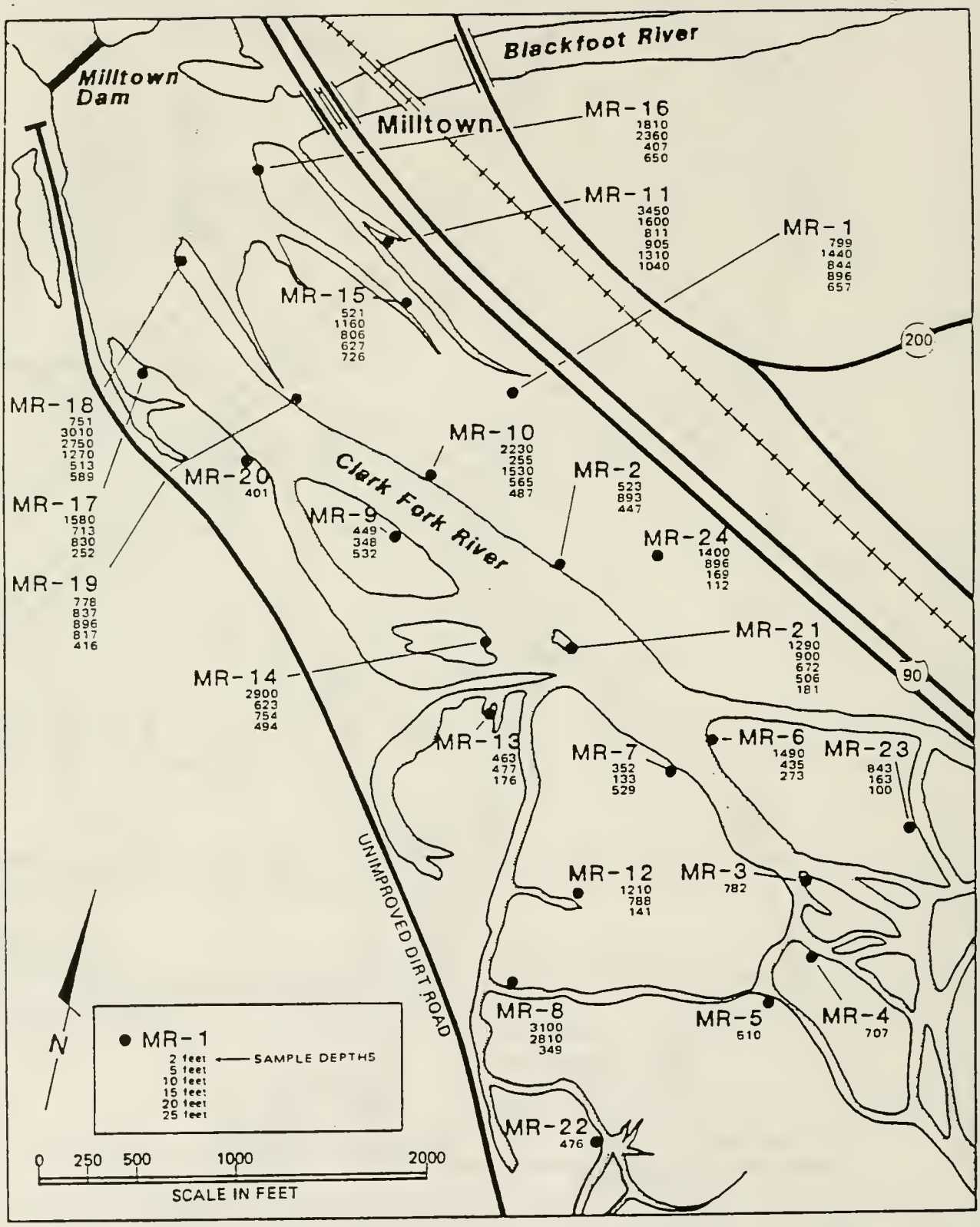


Figure 21: Area and vertical distribution of manganese in subsurface sediments (mg/kg), Milltown Reservoir, Montana (HLA, 1987).

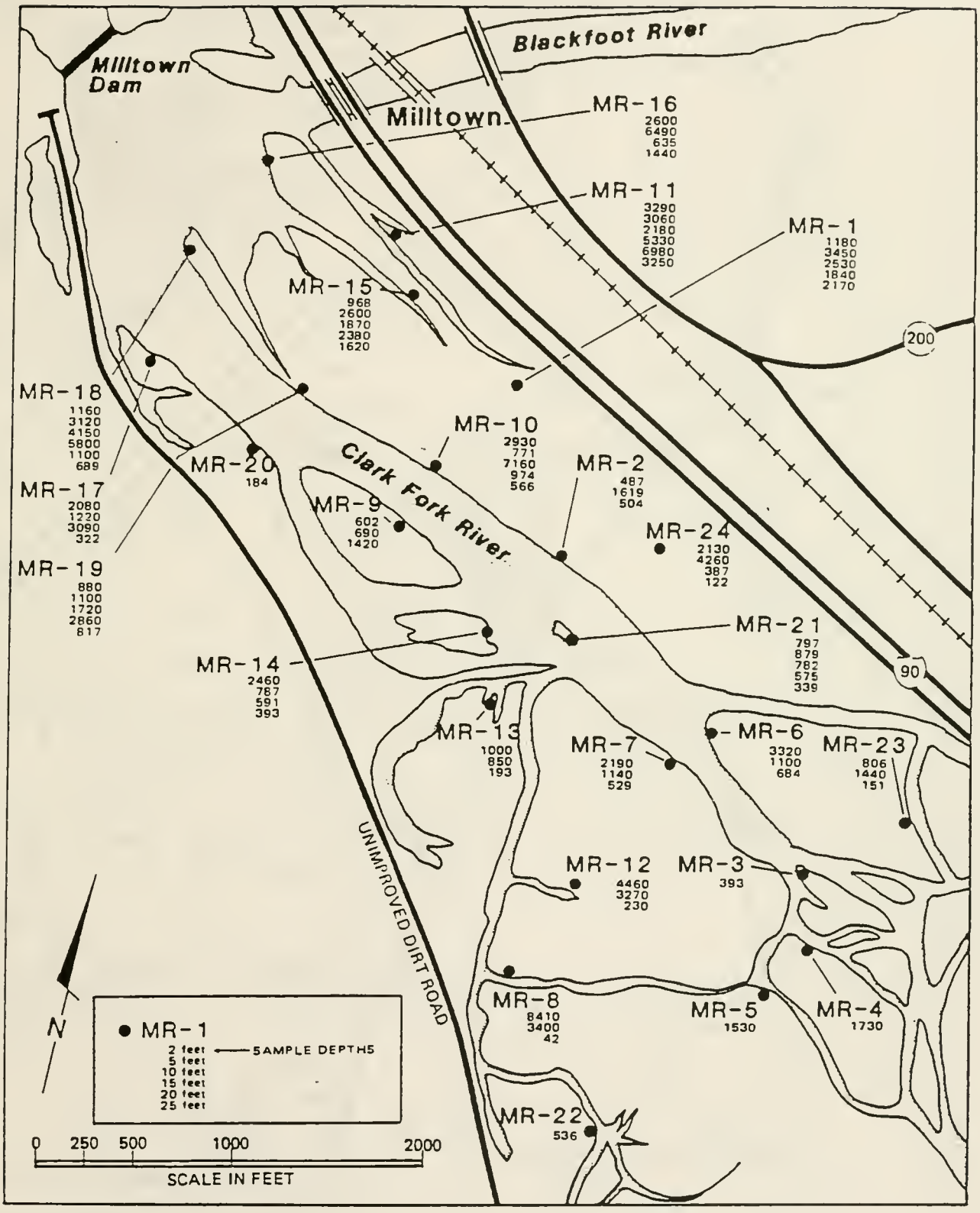


Figure 22: Area and vertical distribution of zinc in subsurface sediments (mg/kg), Milltown Reservoir, Montana (HLA, 1987).

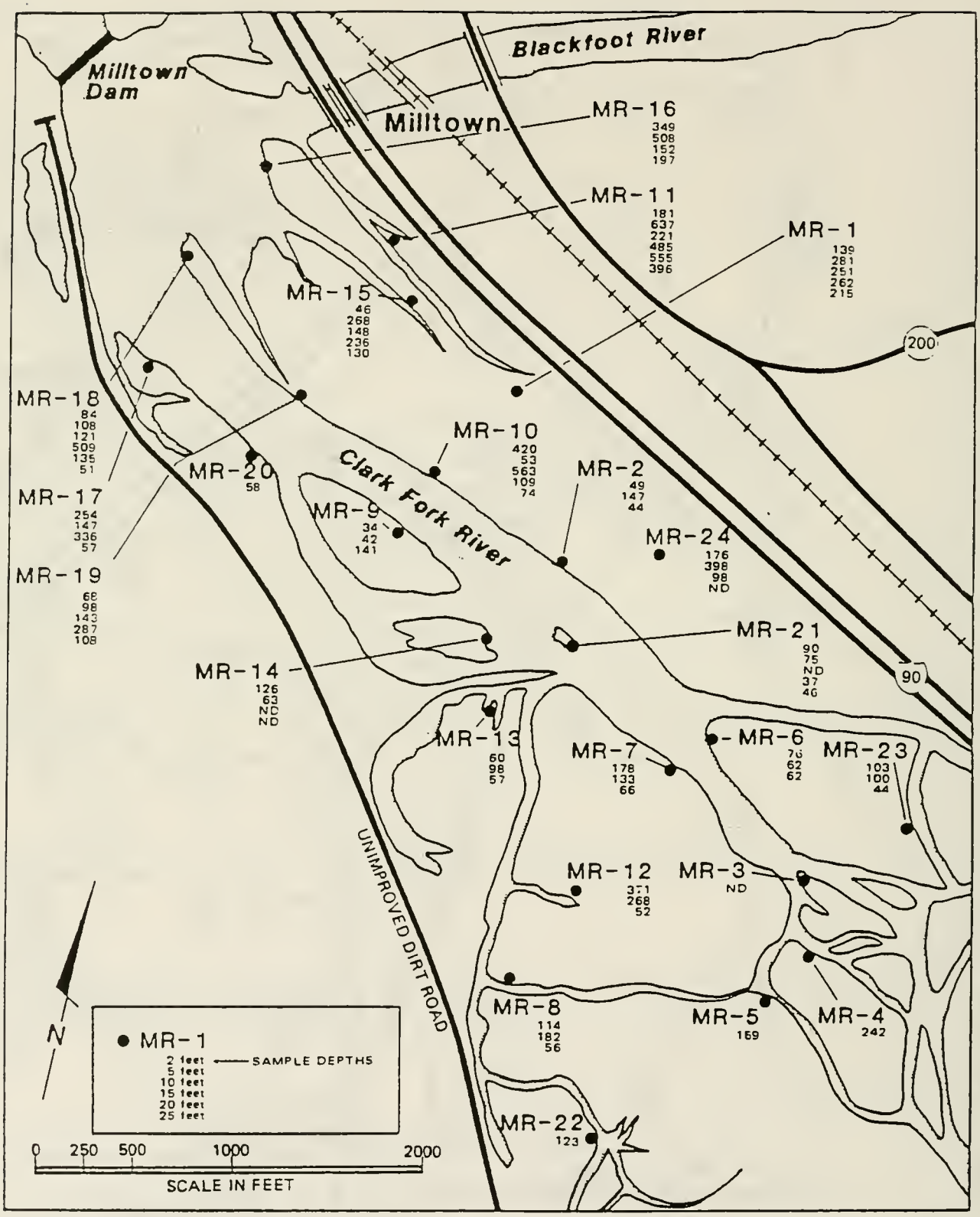


Figure 23: Area and vertical distribution of lead in subsurface sediments (mg/kg), Milltown Reservoir, Montana (HLA, 1987).

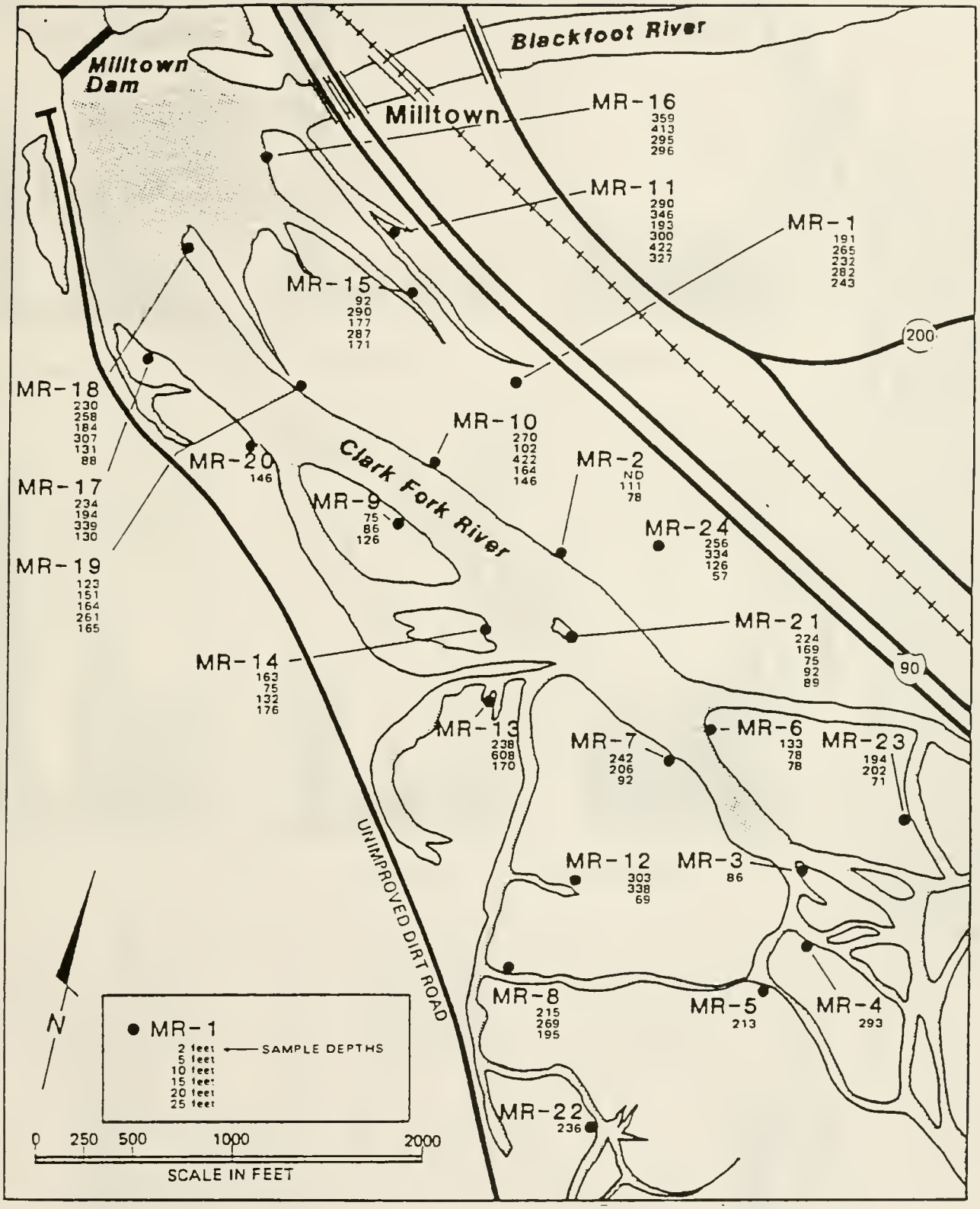


Figure 24: Area and vertical distribution of barium in subsurface sediments (mg/kg), Milltown Reservoir, Montana (HLA, 1987).

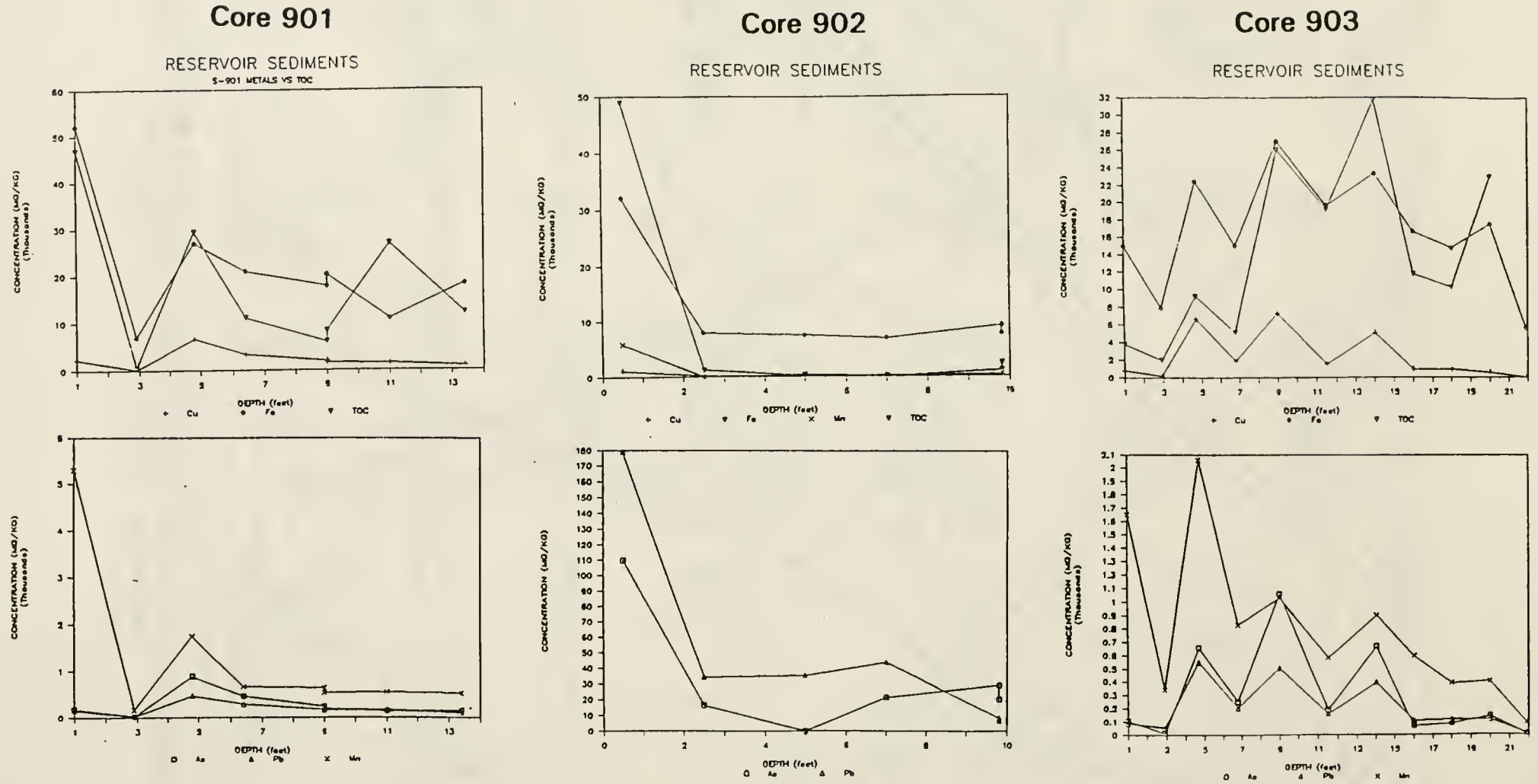


Figure 25: Total concentrations of copper, iron, total organic carbon, arsenic lead and manganese vs. depth in reservoir sediments for core sites 901, 902 and 903 (after ENSR, 1991).

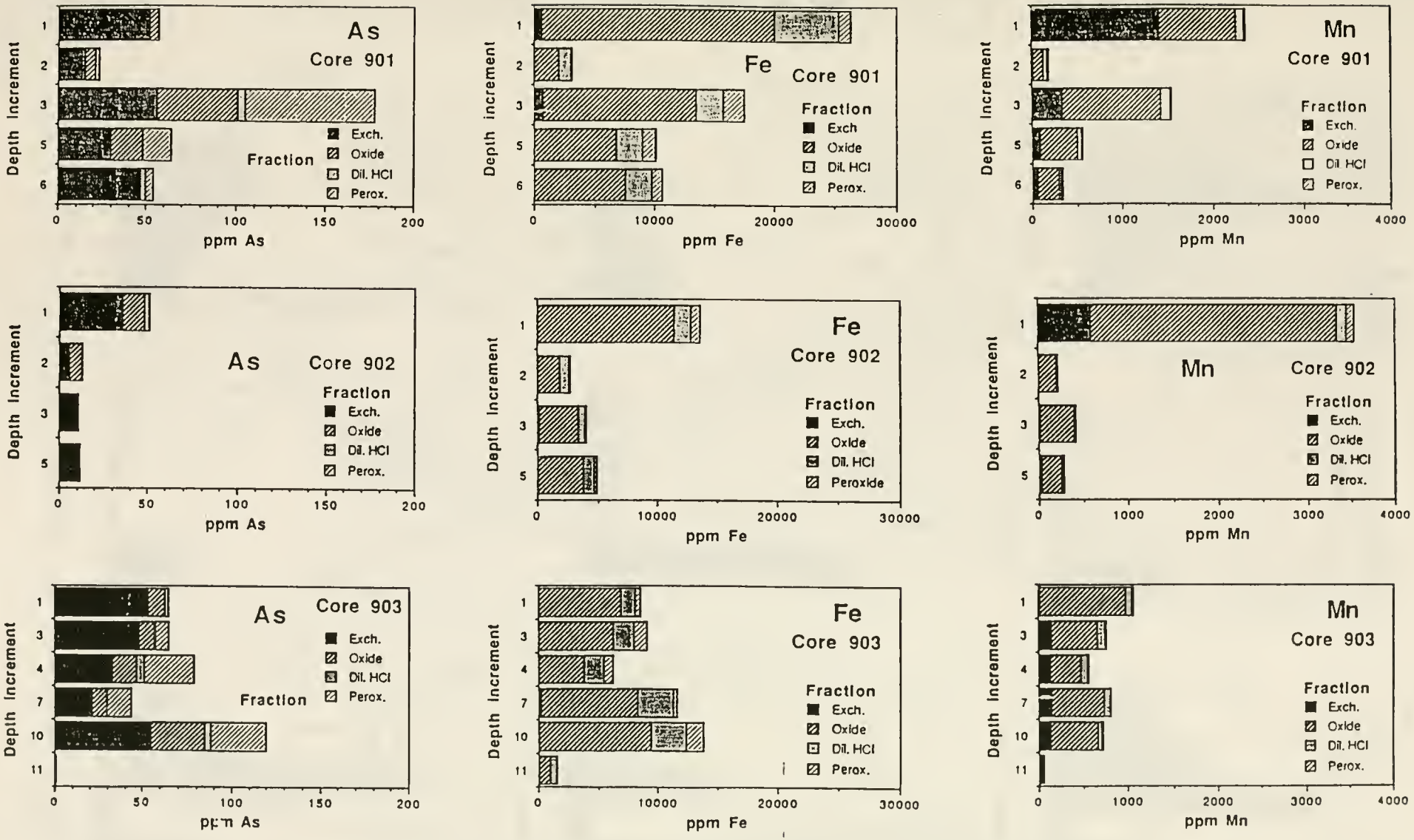


Figure 26: Reservoir sediment extractable fractions of arsenic, iron and manganese concentrations vs depth (ft) for core samples 901, 902 and 903. Exch = exchangeable cations and anions (leach with $MgCl_2$ and NaOH); Oxide = bound to Fe-Mn oxides (leach with hydrozylamine hydrochloride at pH4 in citrate buffer); Dil HCl = labile sulfides (leach with HCl); Perox. = bound to organic matter (leach with hydrogen peroxide) (after ENSR, 1991 and 1992).

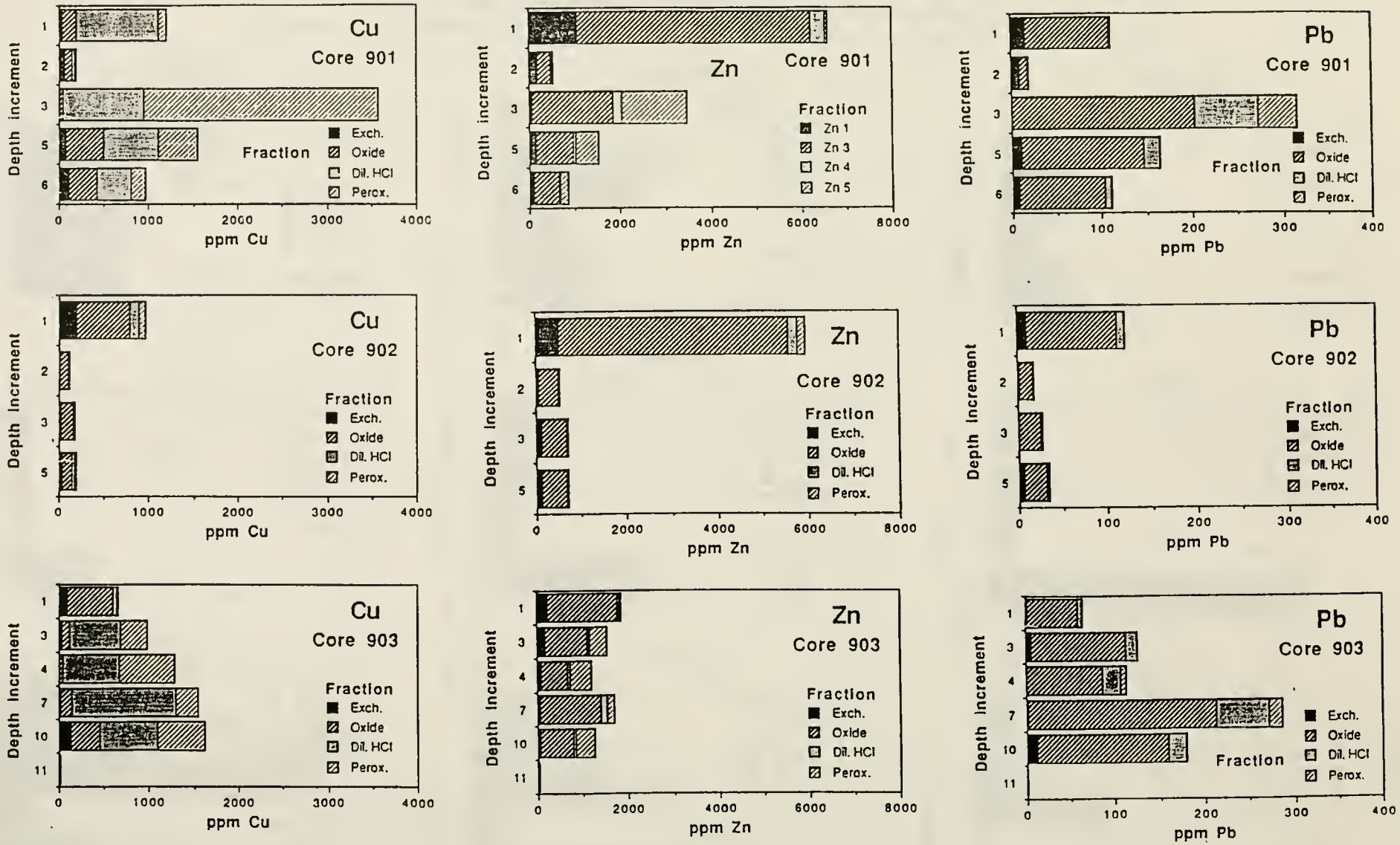


Figure 27: Reservoir sediment extractable fractions of copper, zinc and lead concentrations vs depth (ft) for core samples 901, 902 and 903. Exch = exchangeable cations and anions (leach with $MgCl_2$ and NaOH); Oxide = bound to Fe-Mn oxides (leach with hydrozylamine hydrochloride at pH4 in citrate buffer); Dil HCl = labile sulfides (leach with HCl); Perox. = bound to organic matter (leach with

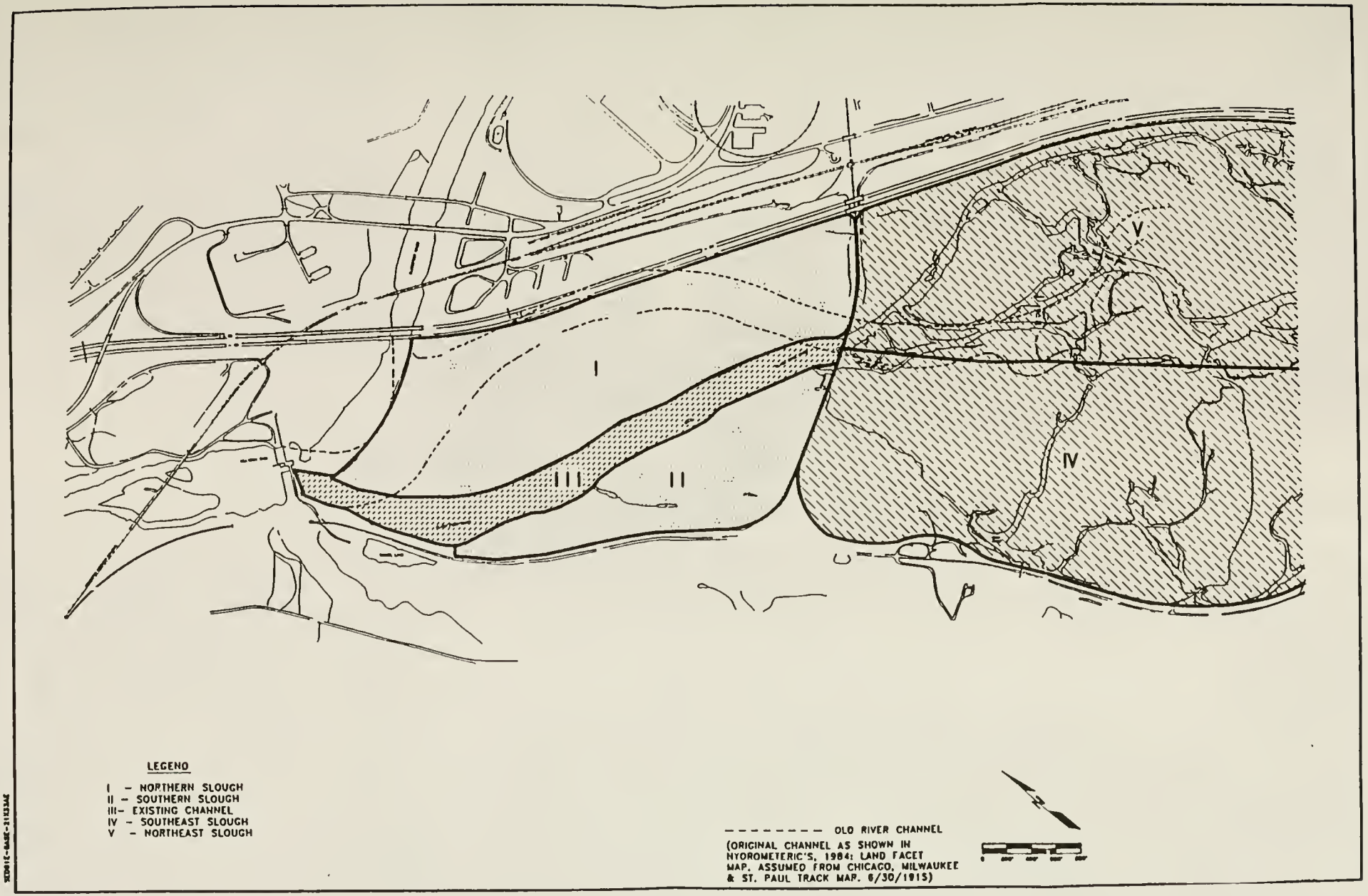


Figure 28: Sediment accumulation areas described by ENSR (1992).

TABLE 3: Reservoir Sediment Samples Collected for Metal Analysis Classified by Accumulation Sites (after ENSR, 1992).

	ENSR Samples	HLA Samples	Woesner et al. Samples
Area I	901, 903	MR-1, MR-2, MR-10, MR-11, MR-15, MR-16, MR-18, MR-19, MR-24	C-2, C-3, C-4, C-5, 8, 9, 20, 21, 22, 23, 33, 34
Area II	WP-2A, WP-213, WP-2C, TP-1, TP-2, TP-3, TP-4, TP-5, TP-6	MR-9, MR-14, MR-17, MR-20, MR-21	1, 15, 25
Area III	900, VC-1, VC-2, VC-3, WP-1	None collected	12, 13, 14, 16, 17, 18, 24, 29, 32
Area IV	902, WP-3, WP-4, WP-5, WP-6, WP-7	MR-5, MR-8, MR-12, MR-13, MR-22	C-6, 19, 30, 31
Area V	WP-8, WP-9, WP-10, WP-11	MR-3, MR-4, MR-6, MR-7, MR-23	26, 27, 28

TABLE 4: Summary of Analytical Data for Total Sediment Chemistry in Areas I Through V, mg/kg (Titan, 1994).

Woessner et al. (a)

Metal	Area I (n = 61)			Area II (n = 3)			Area III (n = 9)			Area IV (n = 13)			Area V (n = 3)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Arsenic	13	280	1,590	45	65	92	7	36	55	45	380	1,420	43	52	65
Barium															
Copper	131	2,000	10,800	387	447	534	39	257	378	303	2,243	7,985	340	362	405
Cadmium	1.4	13	45	3.7	5.3	8.1	0.9	3.2	4.9	3.6	19	53	3.3	3.7	4.3
Chromium															
Iron	11,200	23,300	42,500	19,450	23,600	30,500	15,500	19,600	23,400	21,450	31,100	53,200	16,800	19,900	21,600
Lead	24	230	900	59	68	81	15	47	70	57	259	733	52	59	70
Manganese	351	2,200	24,500	764	1,190	1,860	356	3,100	22,200	560	2,310	6,110	671	770	880
Zinc	373	3,700	10,900	952	1,310	2,030	60	659	952	1,130	4,900	11,200	694	831	933

HLA (b)

Metal	Area I (n = 42)			Area II (n = 18)			Area III (n = 0)			Area IV (n = 11)			Area V (n = 11)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Arsenic	0	279	927	0	101	513				0	177	563	0	114	234
Barium	0	256	422	60	146	339				59	204	338	71	153	293
Copper	178	1,820	5,660	39	540	2,840				61	1,190	3,470	122	660	1,980
Cadmium	0	6	27	0	1	7				0	6	25	0	2	10
Chromium	14	33	69	16	39	103				22	45	222	24	36	61
Iron	6,540	15,900	28,300	6,190	10,900	22,700				8,070	16,000	30,100	6,410	11,300	19,100
Lead	35	225	637	0	87	336				52	140	371	0	97	242
Manganese	249	1,070	3,450	181	800	2,900				141	1,000	3,100	100	520	1,090
Zinc	367	2,420	7,610	184	1,000	3,090				42	2,180	8,410	151	1,230	3,320

ENSR (c)

Metal	Area I (n = 29)			Area II (n = 8)			Area III (n = 9)			Area IV (n = 13)			Area V (n = 7)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Arsenic	8	460	1540	0	8	28	6	32	80	1	33	131	11	174	442
Barium	44	290	471	2	30	79	77	195	405	52	200	480	65	193	396
Copper	20	3,400	10,600	0	70	230	14	206	631	10	460	1,240	129	1,640	3,980
Cadmium	0.9	14.2	36.6	0	0.7	2.6	0.6	2.7	11.9	0.5	3.5	15.6	1.7	8.1	17.8
Chromium	5	12	23	0	2	6	5	9	16	5	12	24	6	12	19
Iron	5,620	21,200	52,100	0	2,800	8,330	5,410	11,100	17,500	6,940	14,200	32,100	5,930	13,900	24,800
Lead	12	306	794	0	9	29	6	30	90	4	67	179	15	151	361
Manganese	94	1,300	5,300	1	270	1,080	110	600	1,730	79	860	5,810	484	518	967
Zinc	27	4,000	13,700	0	380	1,060	21	500	1,710	30	1,150	6,720	312	2,000	4,800

Woessner et al., HLA, and ENSR Investigations

Metal	Area I (n = 132)			Area II (n = 29)			Area III (n = 19)			Area IV (n = 37)			Area V (n = 21)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Arsenic	0	320	1,590	0	71	513	6	34	80	0	200	1,420	0	125	442
Barium	0	270	471	2	111	339	77	195	405	52	200	480	65	168	396
Copper	20	2,300	10,800	0	400	2,840	14	232	631	10	1,303	7,985	122	940	3,980
Cadmium	0	11	45	0	1.2	8.1	0.6	3.0	11.9	0	9	53	0	4.0	17.8
Chromium	5	24	69	0	28	103	5	9	16	5	27	222	6	27	61
Iron	5,620	20,500	52,100	0	10,000	30,500	5,410	15,500	23,400	6,940	20,700	53,200	5,930	13,400	24,800
Lead	12	200	900	0	64	336	6	40	90	4	156	733	0	109	361
Manganese	94	1,700	24,500	1	700	2,900	110	1,900	22,200	79	1,400	6,110	100	560	1,090
Zinc	27	3,400	13,700	0	860	3,090	21	580	1,710	30	2,800	11,200	151	1,400	4,800

Notes:

Where replicate samples were collected the average concentration was calculated for that sample location.

(a) Arsenic Source and Water Supply Remedial Action Study, University of Montana (Woessner et al., 1984)

(b) Milltown Reservoir Data Report Supplemental Investigation conducted under the Feasibility Study, Harding Lawson Associates (HLA, 1987)

(c) Data presented in Appendix S-II

TABLE 5: Summary of Subsurface Total Metal Concentrations According to Lithology Classification, mg/kg (ENSR, 1992).

Subsurface means below 2 feet		Sand	Silty Sand	Mud
Arsenic	Geometric Mean	14.8	113	581
	Average	16.8	189.4	707
	Maximum	27.9	658	1540
Cadmium	Geometric Mean	1.1	3.7	16.4
	Average	1.2	6.1	18.9
	Maximum	1.6	20.9	30.5
Copper	Geometric Mean	43.9	512	4243
	Average	83.1	1629.1	5019
	Maximum	209	6620	10600
Iron	Geometric Mean	5982	14908	23592
	Average	6023	15473	24250
	Maximum	7040	22400	30100
Lead	Geometric Mean	13.3	82.6	374
	Average	15.6	161.2	424
	Maximum	27.7	551	794
Manganese	Geometric Mean	138.2	595	1151
	Average	153	714	1277
	Maximum	255	2060	2090
Zinc	Geometric Mean	82.2	558.4	4381
	Average	345	1414.2	5277
	Maximum	987	4610	9520

All concentrations reported as mg/kg. Lithology defined by percentage passing through 230 sieve. Sand is under 20 percent. Silty sand is 20 to 70 percent. Mud is greater than 70 percent.

TABLE 6: Statistical Summary of Metals in Reservoir Sediments based on Data Collected by HLA (1986), n= 92.

Metal	Concentration Range (mg/kg)	Mean	Standard Deviation
Arsenic	29 - 927	207.0	198.0
Barium	7 - 422	201.0	99.0
Cadmium	5 - 27	7.3	4.6
Copper	39 - 5,560	1,310.0	1,360.0
Chromium	14 - 103	35.6	14.7
Iron	6,190 - 30,100	14,400.0	5,860.0
Manganese	100 - 3,480	921.0	773.0
Lead	33 - 707	171.0	151.0
Zinc	42 - 6,410	1,900.0	1,720.0

baseline concentrations reported in Table 7, it is clear arsenic and metal levels are elevated in the Milltown Reservoir sediments. An estimate of the total tons of various contaminants present in the reservoir can be calculated by using an estimated reservoir sediment volume of 6.6 million cubic yards (HLA, 1987), an average density of the fine-grained reservoir sediment of 1.8 grams/cubic centimeter (Woessner et al., 1984), and the mean concentrations reported in Table 6. These estimates show large quantities of mining and smelting wastes are present in the reservoir (Table 8). The complex stratigraphy of the reservoir is not completely represented by these figures and most likely total tonnages are higher. In addition, the reservoir system is continually accumulating arsenic and metal contaminated sediments, a factor unaccounted for in these values.

Duration of the Release

Tons of wastes are trapped behind Milltown Dam (Table 8). These wastes have accumulated over the last 85 years. Most likely the reservoir filled rapidly with sediments after dam completion. This hypothesis is supported by aerial photographs taken of the reservoir which show the majority of the area occupied by sediment today was already occupied in 1940.

Contaminants are released from the sediments as reservoir water flows through the accumulating sediments and into the underlying basal floodplain material. It is assumed that this process began almost immediately after dam completion, in 1907 and 1908, as the pool elevation rose above the pre-dam floodplain water table. As a result, reservoir water flowed through pre-dam contaminated floodplain sediments and newly deposited wastes. Interviews with residents held during initial RI work revealed that long term residents of the area could not remember having "good groundwater quality". This implies their contamination problem had been occurring for many years prior to formal investigation in 1981 (Woessner et al., 1984).

The release of contaminated groundwater from the reservoir sediments into the adjacent alluvial aquifer is continuous with only small season variation (Woessner et al., 1984; ENSR, 1992).

Relevant Standards

The groundwater resources in the Milltown area are used for domestic, municipal and industrial supply. Thus, the Safe Drinking Water Act Maximum Contaminant Levels and Secondary Maximum Contaminant Levels are considered relevant when assessing injury to the groundwater resources in the Milltown region (EPA, 1992). Samples of groundwater from 186 wells were used to characterize the

Milltown groundwater system. These wells are located on the base map, Figure 1 and Plate 1, and all other plates.

TABLE 7: Baseline Concentrations of Metals for Montana Streams (Essig and Moore, 1992).

		Ruby River	Rock Creek	Gold Creek	$\bar{X}$ RR, RC,GC1
%	Al	(.90)2	(.70)	(1.21)	(.94)
	Ca	7.16	.62	1.61	3.13
	Fe	1.43	1.10	1.54	1.36
	Mg	.91	.37	.54	.61
ppm	As	8.2	8.1	4.7	7.0
	Cd	<.3	<.3	<.3	.223
	Cu	20	11	28	20
	Mn	540	379	858	592
	Ni	15.6	7.5	12.6	11.9
	P	943	1280	1380	1200
	Pb	15.9	11.1	19.3	15.4
	Zn	59.5	36.7	73.3	56.5

TABLE 8: Estimates of Tons of Contaminants found in the Milltown Reservoir Sediments.

Constituent	Range tons
Arsenic	2,100
Barium	2,000
Cadmium	70
Copper	13,100
Chromium	350
Iron	143,900
Manganese	9,200
Lead	1,700
Zinc	19,000

Groundwater samples of the alluvial aquifer in Milltown exceeded one or more of the Safe Drinking Water Act Maximum Contaminant Levels or Secondary Maximum Contaminant Levels for dissolved arsenic, iron, and manganese (Table 9). Exceedences of these standards by the median concentration value calculated for each site from a single well or group of nested wells were considered injury to the groundwater resource.

Data Assessment

The available groundwater quality databases from existing reports as of December, 1994, were compiled and examined to determine which constituents exceeded primary and secondary Safe Drinking Water Act standards. Plate 1 shows the location of 186 wells sampled during investigations of groundwater contamination in Milltown and the vicinity. A database with concentrations of arsenic, iron, and manganese was compiled from all published reports from 1981 to December, 1994, and is found in Appendix B. Water quality data are for dissolved constituents. Samples are listed by well number and ordered by date. Data qualifiers are also included as given in the source reports. When a value for a particular analyte in a study is not given, listed as not analyzed, listed as not required, or was rejected by report authors, no value is reported. Instead the space is marked "NA", for not analyzed. Values reported as below detection limits are listed as reported in the original reference. The source of each data point is indicated in the database.

The data in Appendix B were then evaluated and a second data set prepared by replacing below detection limit reported data with a value equal to one half the detection limit of the sample tested. The detection limits used are based on quality control criteria stated in original quality assurance plans and sampling and analysis plans or based on independent review of project results (Table 10). Mean concentrations for each well were then calculated using all values except those listed as NA which were excluded. This database is found in Appendix C.

In an attempt to simplify analyses of this complex data set, median concentrations for values at each well site were rank ordered and median values for each contaminant obtained. Values were rounded to whole numbers unless the value was less than one. Values reported as less than one are rounded to the nearest one tenth. "NA"s were not included in the ranking. The median value is considered representative of the water quality at a given well site and is believed to be conservative. For mapping purposes when a single value is used to represent a group of samples collected at the same location but from multiple wells finished at different depths (i.e. 122a, 122b, 122c), data from each well were combined into a single data set, the data set was ranked and the median was determined. A single well number was then assigned to the location without being followed by a letter. The selection of the median value is justified by the absence of consistent seasonal trends over the majority of the site, the presence of occasional outliers,

TABLE 9: Primary and Secondary Maximum Contaminant Levels for Drinking Water (EPA, 1992).

Constituent	Primary MCL (ug/l)	Secondary MCL (ug/l)
Arsenic	50	
Iron		300
Manganese		50

TABLE 10: Detection limits for Groundwater Analyses, Milltown.

Source	As (ug/l)	Fe (ug/l)	Mn (ug/l)
Woessner, et al. (1984)*			
1981 - 1982	5	100	10
6/83 - 12/83	5	100	50
1/84 - 6/84	5	30	20
Harding Lawson Assoc. (1986)	2	50	5
UDALOY (1988)			
8/86 - 11/86	30	8	1.8
12/86 - 7/87	30	6	1.7
8/87	20	3	0.2
Camp Dresser & McKee, Inc. (1989)	1.9	22.6	1.9
ENSR (1991,92)			
10/90	3	8	7.5
6/91	2	20	1
10/91	2	11	1
6/92	1	27	3

* As determined by CDM (1985)

and the variability in the size of the data sets. It is believed that variability associated with the data is most likely linked with field and lab errors. For the purpose of this analysis no values were rejected. A table of median concentrations for the wells in the Milltown area is found in Appendix D.

Values of constituents cited in report texts were assumed accurate and are cited in general discussions of the source character, manner of release and pathways discussions.

Testing and Sampling Methods

All testing and sampling methods are described in the reports referenced in Appendix B. Standard procedures were followed and data are considered representative. Sampling methods employed by HLA (1985 and 1986) may have resulted in arsenic and metal values reported by the lab being lower than actual groundwater concentrations. Groundwater samples were bailed and placed in a stainless steel bucket prior to filtration for metal preservation. This process most likely resulted in the precipitation of some iron and manganese, and co-precipitation of arsenic and other metals prior to filtering, bottling and preservation of a sample for dissolved metals.

Manner of Release and Pathway

Physical Characteristics of the Aquifer

The reservoir sediments are permeable and saturated to the reservoir pool level. A groundwater flow system is present in the reservoir sediments. It is recharged principally from reservoir pool water and also by direct precipitation. Reservoir groundwater generally flows towards the north and northwest, and downward (Figure 8). Water level data from nested monitoring wells constructed in the reservoir sediment document the presence of large vertical downward hydraulic gradients (Figure 9). Udaloy (1988) conceptualized groundwater flow in the reservoir sediment as being controlled partly by the presence of a basal zone of coarse alluvium believed to be the pre-dam floodplain and river channel sediment (Figure 8). Though her flow net represent both the sediments and gravel having isotropic homogeneous hydraulic properties, it is recognized that actual detailed flow paths are more complex. In addition to the transport of hazardous materials from the reservoir sediment to the underlying alluvium, direct groundwater transport to the surface water source most likely occurs in the upper-most portion of the sediment when the reservoir stage is lowered (Titan, 1994).

Groundwater originating in the reservoir carries contaminants from the reservoir sediments to the adjacent connected sand, gravel and cobble aquifer supplying Milltown. The coarse sediments making up the aquifer beneath Milltown carry reservoir sediment contaminated groundwater north and west (Figure 5 and 6). This groundwater has affected the water quality tapped by wells south of

the railroad tracks in Milltown and west of the Blackfoot arm of the Milltown Reservoir.

Mobility of Hazardous Substances

Arsenic, metals and high groundwater migrates from reservoir sediments to the underlying and adjacent highly conductive sand, gravel and cobbles. Udaloy (1988), Moore et al. (1988 and 1993), ENSR (1991 and 1992) and Titan (1994) describe the geochemical processes releasing arsenic and metals from the reservoir sediments. Metals and arsenic are released as groundwater flows through submerged oxidized and reduced zones in the sediment. Reservoir stage fluctuations result in a rise and fall of the water table in the sediments which in turn causes a migration of the redox boundary. This process produces the de-stabilization of geochemical equilibrium and allows mobilization of arsenic and metals (Figure 29). Udaloy (1988) describes the process as follows: "Lowering the water table causes oxidation of previously reduced sediments. Oxidation of sulfide minerals and/or organic matter releases arsenic, which co-precipitates with iron and manganese oxyhydroxides. Raising the water table causes reduction of previously oxidized sediments. Reduction of iron and manganese oxyhydroxides liberates co-precipitated arsenic. Arsenic released to groundwater in anoxic environments typically remains in solution, reflecting limited sulfide concentrations in this system. Absolute arsenic concentrations in groundwater depend on depositional concentrations in sediments, which are modified by local diagenetic environments and advective flow." Moore (1993) describes this process as a redox pump and illustrates the process by comparing reservoir sediment groundwater chemistry during low stage and after the stage increases (Figure 30). The processes described in these figures are in continuous operation as variations in the reservoir stage, because of power generation and flood control, occur throughout the year.

Titan (1994) presents a similar geochemical model for the reservoir sediments that allows for the thickness of reducing, transition and oxidizing zones to remain relatively stable. However, arsenic, iron and manganese are continually released principally from the transition and reduced zones. They estimate about 570 tons of arsenic in a reservoir area of 4,350,000 ft^2 will eventually migrate from the reservoir (Figure 31).

The arsenic and constituents released from the reservoir sediments migrate with the groundwater flow system. Maps showing the total arsenic in the groundwater system sampled in the spring and fall, and the corresponding groundwater flow directions are presented in Figures 32 and 33 (ENSR, 1992). Large vertical gradients exist between the fine-grained reservoir sediments and the adjacent coarse saturated material (Figure 9). ENSR (1992) proposed that hydraulic gradients increase during the late fall and winter months as the water table in the Milltown aquifer continue to decline as the reservoir stage is maintained at about 3,260 ft.

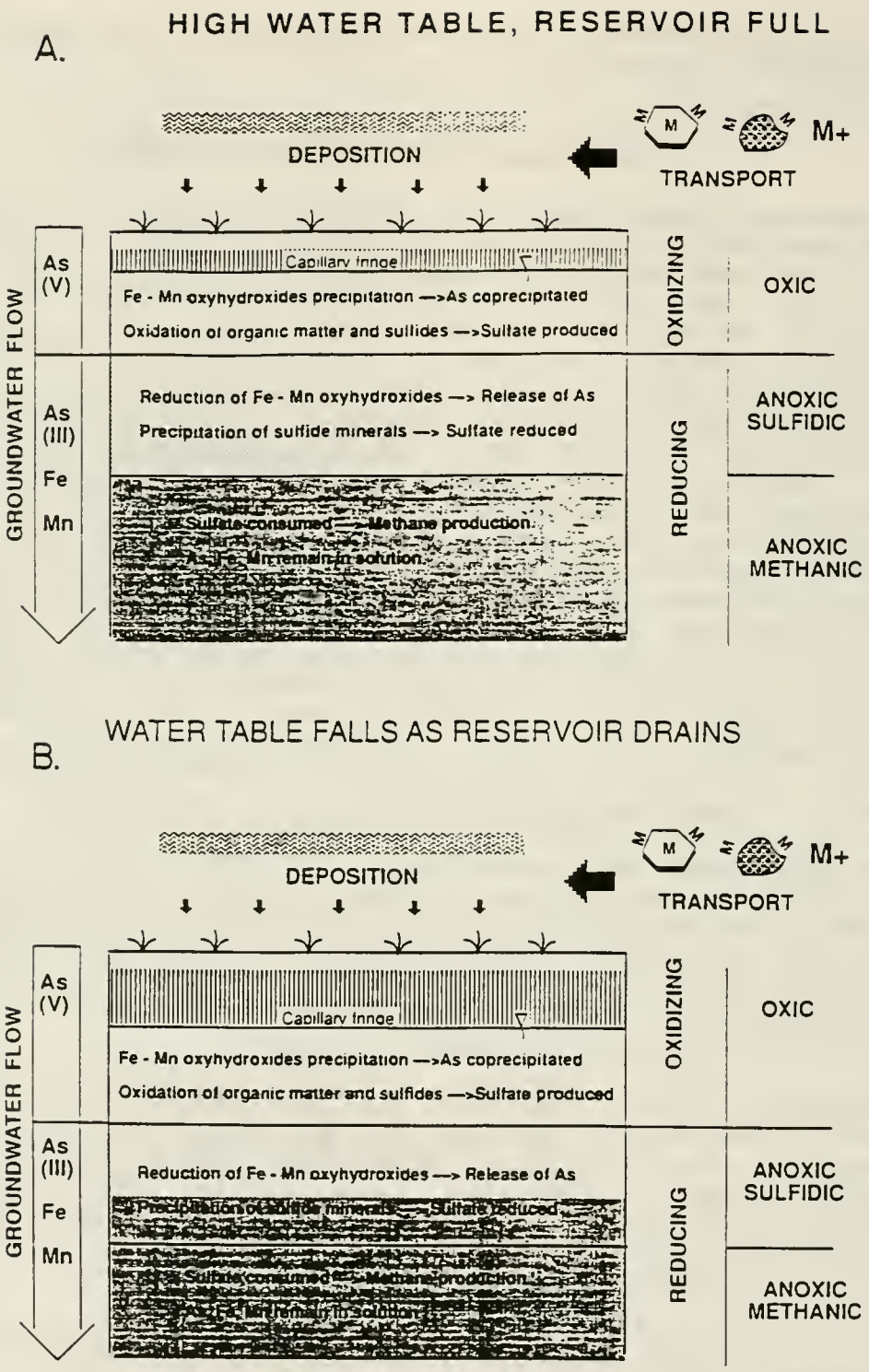


Figure 29: Geochemical model illustrating the development of redox environments as reservoir stage falls: A) Reservoir at full stage; B) Low reservoir stage. Scale of this system is highly variable. The oxic zone, depicted by the lightest stippled pattern, is generally 0.3 to 1.6 ft thick at high stage and 1.6 to 4.9 ft thick at low stage. The reducing zone, depicted by the medium stipples, extends to depths of from approximately 16 to 26 ft. The presence of the methanic zone, heavy stipples, is likely to be extremely variable (after Moore, 1993).

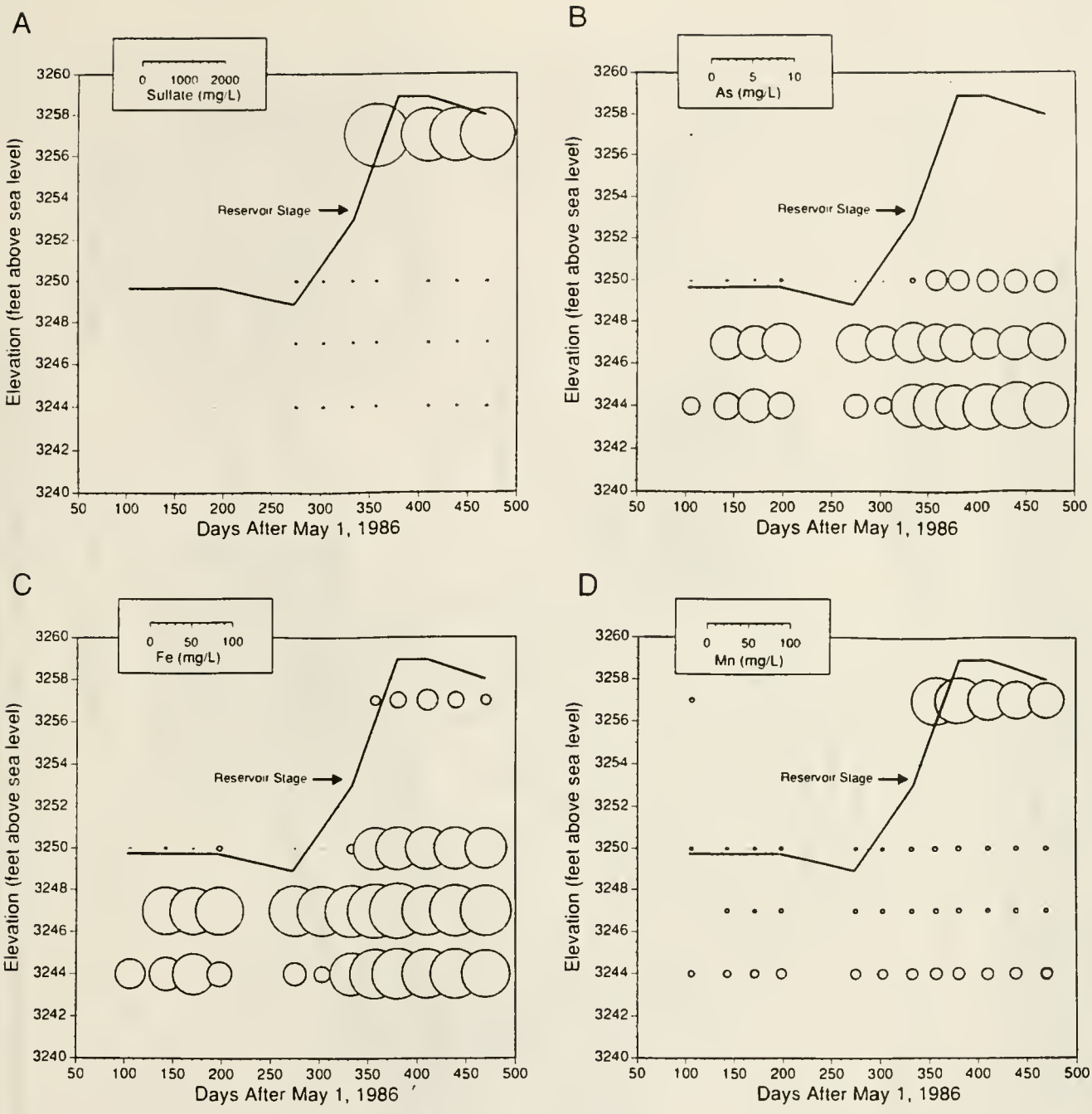


Figure 30: Bubble diagrams of concentrations (mg/l) of chemical components and pH of groundwater in nested wells at location 138 showing changes with time at different depths. The upper scale bar (bubble diameter) is the concentration of the species as depicted by a bubble; vertical axis is the elevation of the screened interval of the well; the horizontal axis is the days since drawdown of the reservoir. A) Sulfate, B) Arsenic, C) Iron, D) Manganese (after Moore, 1993).

GEOCHEMICAL ZONE	REMOVED FROM SOLUTION		IN SOLUTION	
	PRECIPITATED	ADSORBED		
OXIDIZED	IRON OXYHYDROXIDE MANGANESE OXIDE	ARSENIC BY IRON OXYHYDROXIDE	SULFATE	SEDIMENT
TRANSITION	-	ARSENIC BY IRON OXYHYDROXIDE	SULFATE IRON, ARSENIC MANGANESE	SEDIMENT
REDUCING: SULFUR AVAILABLE	IRON SULFIDE	-	IRON, ARSENIC MANGANESE	SEDIMENT
REDUCING: SULFUR DEPLETED	NO NEW MINERALS FORM	-	IRON, ARSENIC MANGANESE	SEDIMENT
REDUCING: SULFUR DEPLETED	NO NEW MINERALS FORM	-	IRON, ARSENIC MANGANESE	ALLUVIUM
OXIDIZED	IRON OXYHYDROXIDE MANGANESE OXIDE	ARSENIC BY IRON OXYHYDROXIDE	-	ALLUVIUM

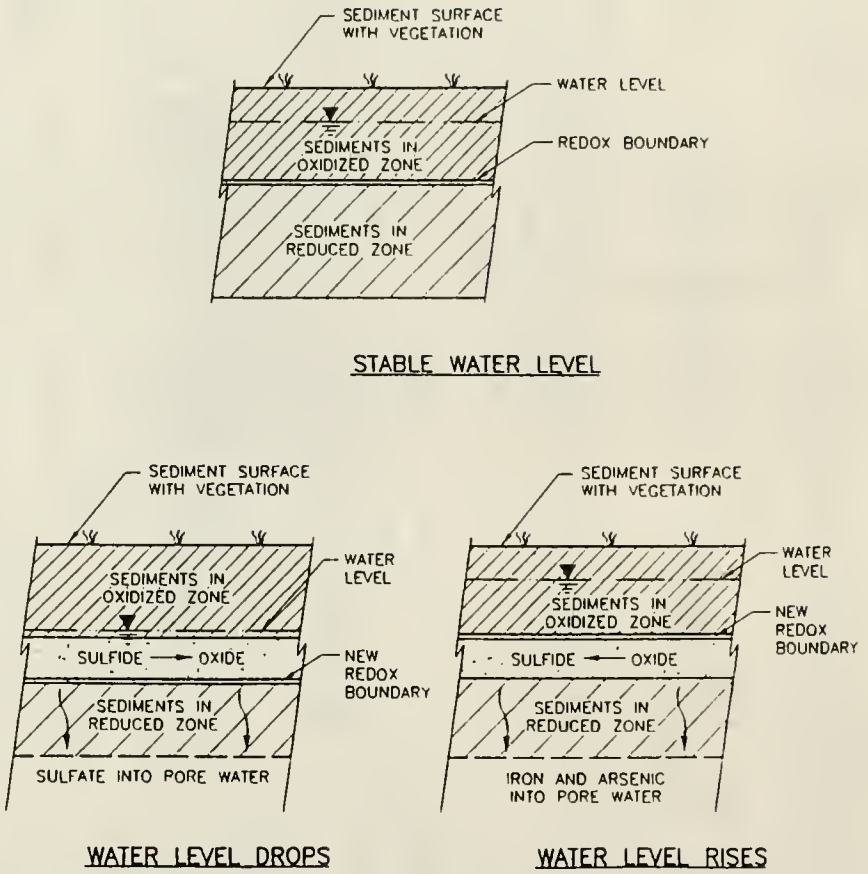


Figure 31: Geochemical model of the reservoir sediments proposed by Titan (1994). Hazardous constituents migrate with the groundwater as reservoir stage changes and groundwater flows downward through the transition and reducing zone.

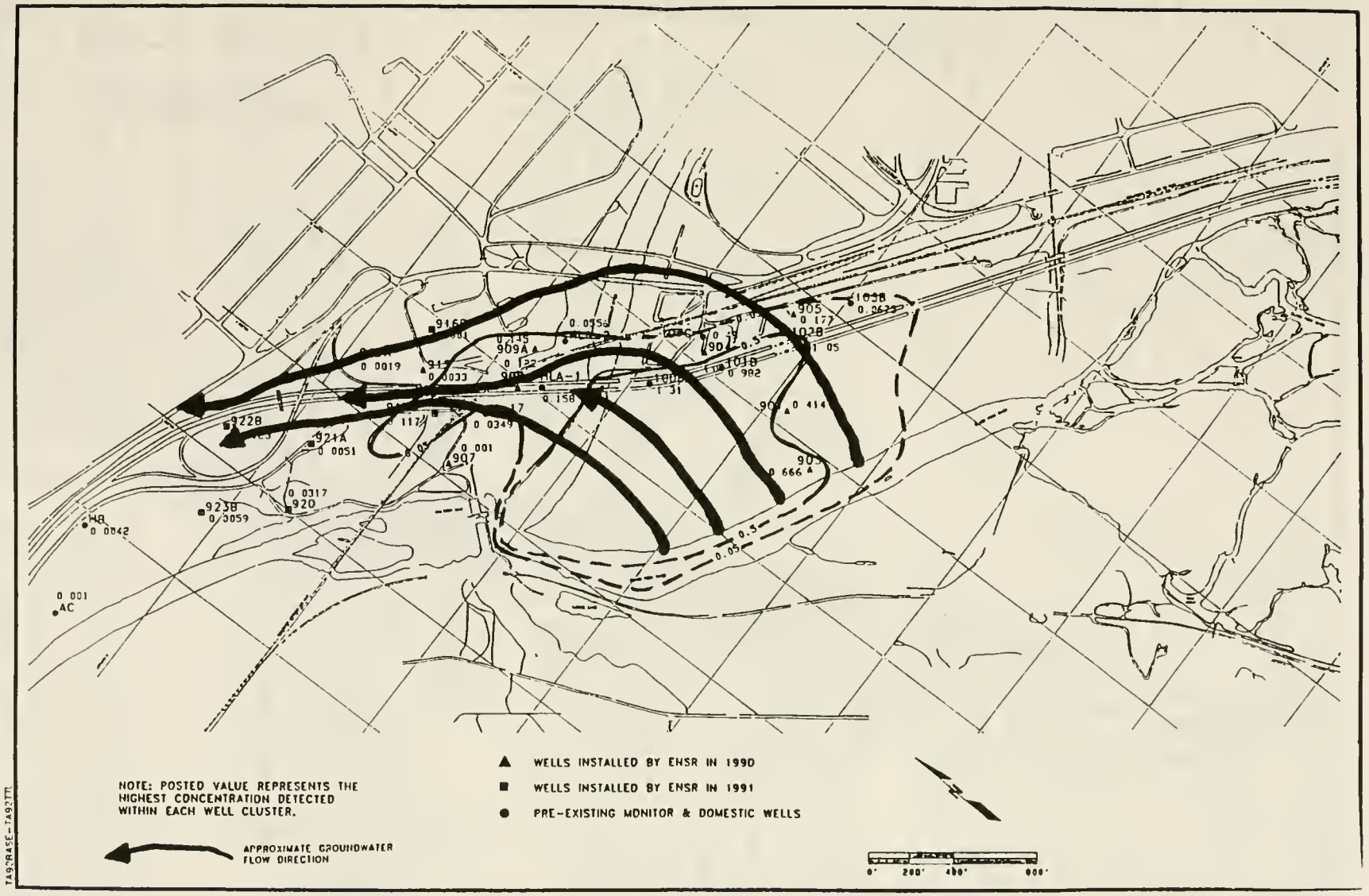

NOTE: POSTED VALUE REPRESENTS THE HIGHEST CONCENTRATION DETECTED WITHIN EACH WELL CLUSTER.
WELLS INSTALLED BY ENSR IN 1990
WELLS INSTALLED BY ENSR IN 1991
PRE-EXISTING MONITOR & DOMESTIC WELLS
APPROXIMATE GROUNDWATER FLOW DIRECTION
0.5
0.05
0' 200' 400' 800'

Figure 32: Spring distribution of total arsenic in the groundwater and the general direction of groundwater flow. Iso-concentrational lines are 0.5 and .05 mg/l and dashed where inferred (after ENSR, 1992).

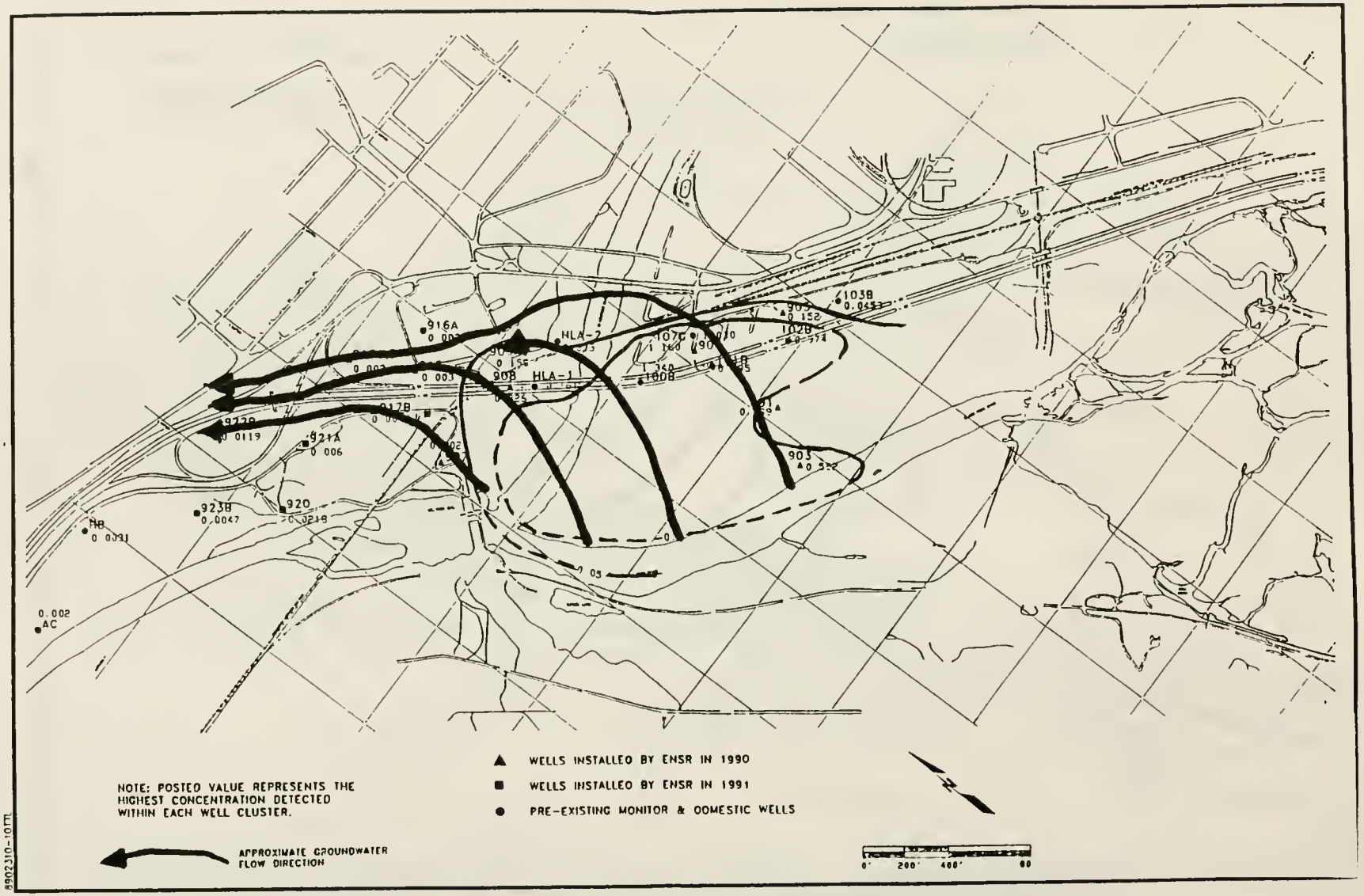


Figure 33: Fall distribution of total arsenic in the groundwater and the general direction of groundwater flow. Iso-concentrational lines are 0.5 and .05 mg/l and dashed where inferred (after ENSR, 1992).

The groundwater emanating from the reservoir sediments flows north-northwest and enters Milltown. Uncontaminated groundwater systems flowing towards Milltown from the northeast and east combine in Milltown, and flow is directed northwest under the Blackfoot River and to the west (Figure 6). As a result the groundwater underlying the southwestern portion of Milltown has been contaminated with arsenic, and metals. However, relatively sharp boundaries between contaminated and uncontaminated groundwater are present. Plates 2, 3, and 4 present map views of the arsenic, iron, and manganese median concentrations in Milltown groundwater. Maximum median concentrations are associated with the groundwater in the reservoir sediments. Concentrations decrease in the direction of groundwater flow, to the northwest and west as is also shown in Figures 32, 33 and 34. Generally, wells located south of the railroad tracks and immediately adjacent to the western end of the reservoir sediments show the highest concentrations of contaminants outside of the reservoir sediments. Arsenic and metal concentrations decrease in the direction of groundwater flow as expected.

Table 11 presents a comparison of dissolved arsenic concentrations for wells sampled during 1983 to 1984 and by ENSR between 1990 to 1992 (Titan, 1994). The concentrations of arsenic appear to be increasing at wells in the Titan defined plume area. The presence of an apparent increase in arsenic concentrations may imply geochemical mechanisms are not fully understood and insufficient time has passed to fully evaluate the final extent and fate of metal migration in the alluvial aquifer. Both original studies of the Milltown area and ENSR's work concluded that the large volumes of waste in the reservoir, the geochemical setting, seasonal reservoir stage changes and the continual addition of contaminated sediment from up stream will sustain hazardous waste release for hundreds of years (ENSR, 1992; Titan, 1994).

GROUNDWATER INJURY QUANTIFICATION

Water quality data were compiled from 186 wells in and adjacent to the Milltown Reservoir (Figure 1, Plate 1 and Appendix B). Water quality samples from multiple wells separated by greater than 100 ft exceeded drinking water standards for one or more constituents in a number of areas in the vicinity of Milltown. Generally, groundwater located outside the reservoir sediments and southern portion of the Milltown area is not contaminated.

Baseline Conditions

Groundwater in the Milltown region is used for domestic, municipal and industrial supply. Though the water quality from wells directly associated with monitoring for the contaminant plume typically exceeds drinking water standards, the water from other wells in the region is unaffected by the contaminated groundwater. It is these uncontaminated samples that were used to represent background or baseline groundwater quality. The baseline or

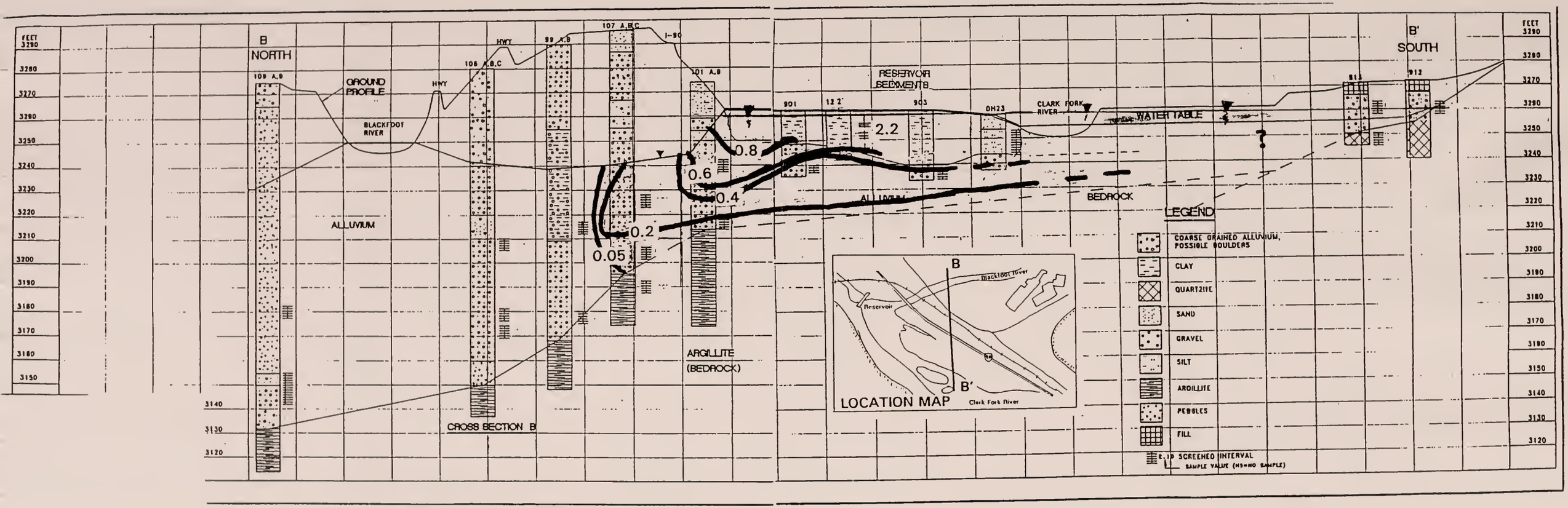


Figure 34: North- south cross section showing the median concentration of dissolved arsenic measured in the groundwater (mg/l). The shaded area is the general area of contaminated groundwater. The horizontal scale is 1"=400'; the vertical scale is 1"=40'(modified from ENSR, 1992).

TABLE 11: Comparison of Arsenic Concentrations in 1983-1984 and 1990-1992 for the Arsenic Plume Area, Northern Hydraulic Boundary Area and the Upgradient Area (Titan, 1994).

ARSENIC PLUME AREA

Well No.	Dissolved Arsenic Concentrations (mg/l)	
	Woessner (1983 - 1984) (a)	ENSR (1990 - 1992) (b)
M-17	<0.003	0.043 - 0.207
100A (c)	0.023 - 0.080	1.01 1.25
100B	0.412	1.26 - 1.5
101B	0.634 - 0.884	0.941 - 1.07
102A	0.216 - 0.631	0.805 - 0.874
102B	0.300 1.10	0.806 - 1.07
103A	<0.003 - 0.0200	0.0426
103B	<0.003 - 0.0390	0.0424 - 0.0579
107B (c)	<0.003 - 0.509	<0.003 - 0.0048
107C	0.023 - 0.766	0.331 - 1.45

NORTHERN HYDRAULIC BOUNDARY AREA

Well No.	Dissolved Arsenic Concentrations (mg/l)	
	Woessner (1983 - 1984) (a)	ENSR (1990 - 1992) (b)
99A	<0.003	<0.003
99B	<0.003	<0.003
104A (c)	<0.003 - 0.0060	0.0076 - 0.0087
104B	<0.003 - 0.0163	0.0110 - 0.0116
105A	<0.003	<0.003 - 0.0077
105B	<0.003	<0.003 - 0.0035
105C	<0.003	<0.003
106A	<0.003	<0.003
106B	<0.003	<0.003
106C	<0.003	<0.003
108A	<0.003	<0.003
108B	<0.003 - 0.025	<0.003
109A	<0.003	<0.003
109B	<0.003	< 0.003 - 0.004

UPGRADIENT AREA

Well No.	Dissolved Arsenic Concentrations (mg/l)	
	Woessner (1983 - 1984) (a)	ENSR (1990 - 1992) (b)
35	<0.003	<0.003
36	<0.003	<0.003
110A	<0.003 - 0.0140	<0.003 - 0.0058
110B	<0.003 - 0.0170	0.014 - 0.0175
111A	<0.003	<0.003
111B	<0.003	<0.003

Notes

(a) From Arsenic Source and Water Supply Remedial Action Study, University of Montana (Woessner et al., 1984)

(b) From Table 5-9

(c) Denotes bedrock well

Shading indicates that the concentration is above the federal MCL of 0.050 mg/l for dissolved arsenic

The lower detection limit for dissolved arsenic varied between investigations and sampling events with the highest value being 0.003 mg/l. All reported nondetect values for arsenic plus detected concentrations below 0.003 mg/l are presented as <0.003 mg/l.

Refer to Figure 5-13 for well locations.

control area groundwater quality in the Milltown area is represented by the water quality of wells located outside of the plume area. The criteria used to designate groundwater quality data as baseline included the conditions that:

1. Wells were located in a similar geologic setting;
2. Wells were located in a similar groundwater flow system;
3. Wells were close to the contaminated area;
4. Wells were completed in the same aquifer that is contaminated;
5. Water quality data were readily available.

Table 12 lists the wells used to represent baseline for arsenic, iron, and manganese. The locations of the wells are presented on the base map (Figure 1 and Plate 1) and in Figure 35. These wells were selected by reviewing the water quality data presented in Appendix D. A baseline groundwater quality was determined by rank ordering median concentrations of samples taken from wells listed in Table 12 and determining the median value of that group of values. The results of this analysis are presented in Table 13. These concentrations are similar to those found in the Missoula Aquifer located five miles to the west (Woessner, 1988). This aquifer is also a high hydraulic conductivity, unconfined sand, gravel and boulder aquifer similar in character to the aquifer underlying Milltown.

Extent of Injured Groundwater

The area underlain by groundwater that exceeds a standard for arsenic, iron, and manganese as defined in Table 9, was estimated using two methods. The first method, Model1, employed a hydrogeologist (the author) to interpret the median concentration data using linear interpolation and his knowledge of the hydrogeologic setting of the site. The second method, Model2, used an automated weighted average interpolation scheme with a search radius of 1,148 ft to create a digital elevation model using PAMAP GIS software (PAMAP, 1992). Figures 36 to 38 and Plates 2 to 4 represent the results of constituent mapping.

The total volumes of contaminated groundwater at this site were calculated for both models using PAMAP to numerically determine areas, average depth values and a range of porosity values for the reservoir sediments and adjacent alluvium. The saturated thickness of the reservoir sediments was simplified from the work of ENSR (1992) and HLA (1987) as shown in Figure 39. It was assumed the sediments mapped in zone A, B, C and D were 20 ft, 17.5 ft, 12.5 ft and 7.5 ft thick, respectively. The saturated volume of the sand, gravel and cobble alluvium that is underlying the reservoir sediments and forms the Milltown aquifer was generalized from Titan (1994) bedrock contour data, and interpretation of drilling and geophysical data summarized in the form of bedrock contour and saturated thickness plots by Schombel (1994). The polygons used for the area calculations are presented in Figure 40 and the isopach maps are presented in Appendix A. Volume calculations were completed by multiplying the reservoir

TABLE 12: 64 Wells Used to Represent Baseline Groundwater Quality.

Well #	
3	DW-9
17	DW-13
18	E
19	F
20	G.T.C.
21	H
23	HB
24	H3
25	H4
26	H8
27	I
28	IRM
29	L
30	M16
35	MT19
36	OH
99	T.G.
106	T.N.
108	
109	
111	
907	
914	
915	
916	
919	
921	
922	
923	
A	
AC	
A1	
A2	
A3	
A4	
A8	
B	
C	
C1	
C2	
C21	
C3	
C4	
C5	
C6	
C8	
D	

TABLE 13: Median Baseline Concentrations for Milltown and Vicinity.

Constituent	Median concentration	(n)
Arsenic	3 ug/l	(64)
Iron	38 ug/l	(61)
Manganese	10 ug/l	(61)

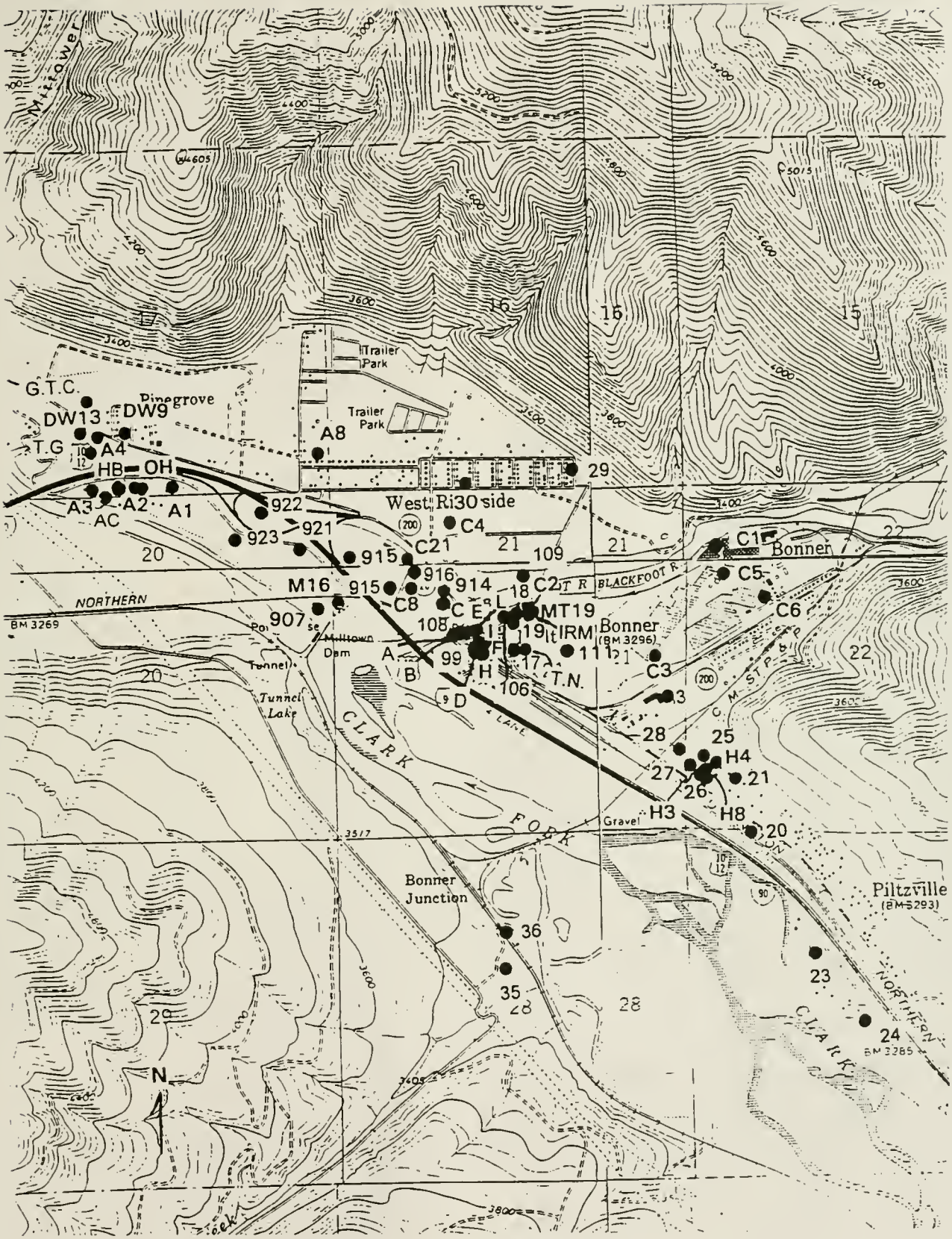
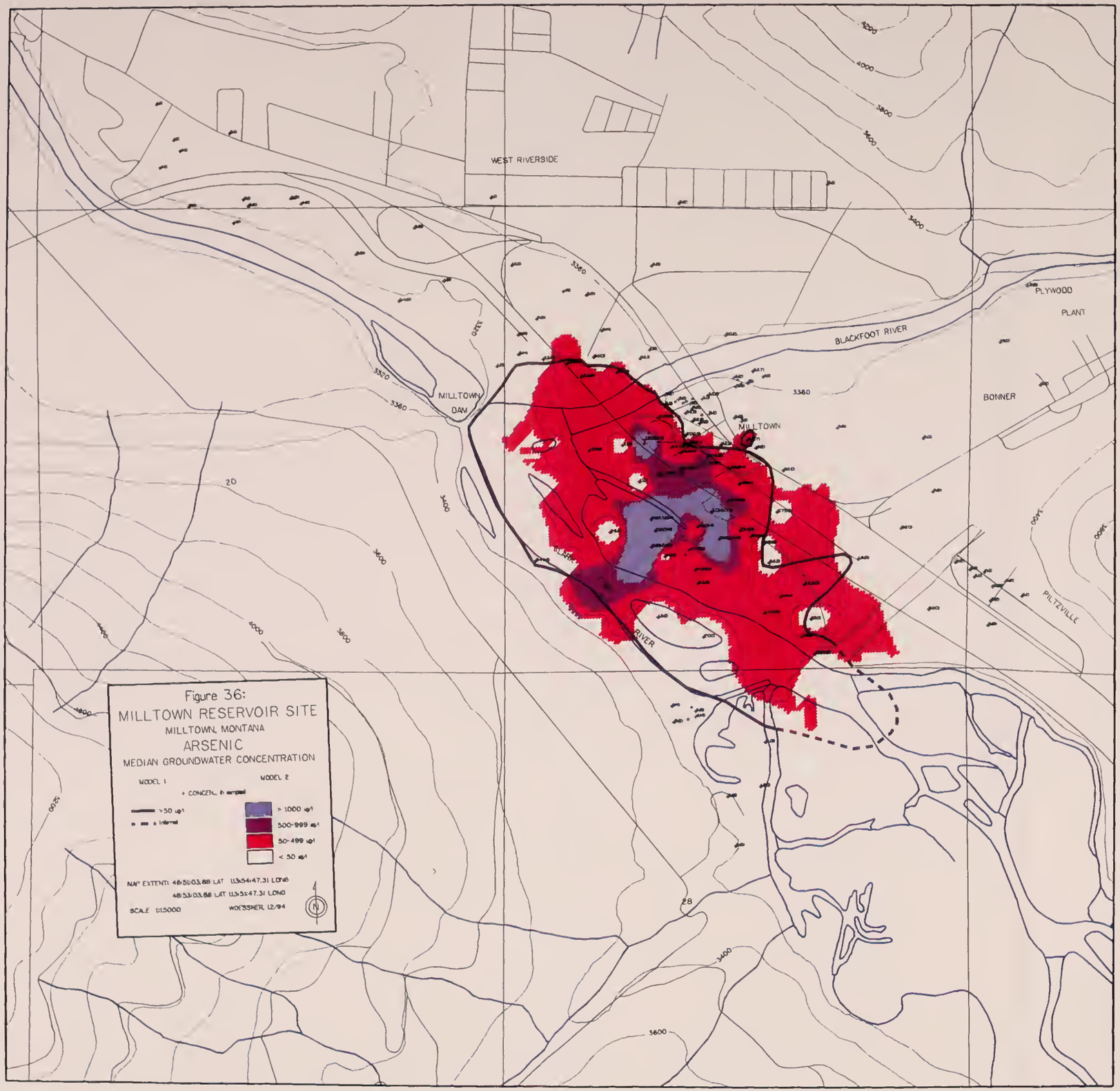
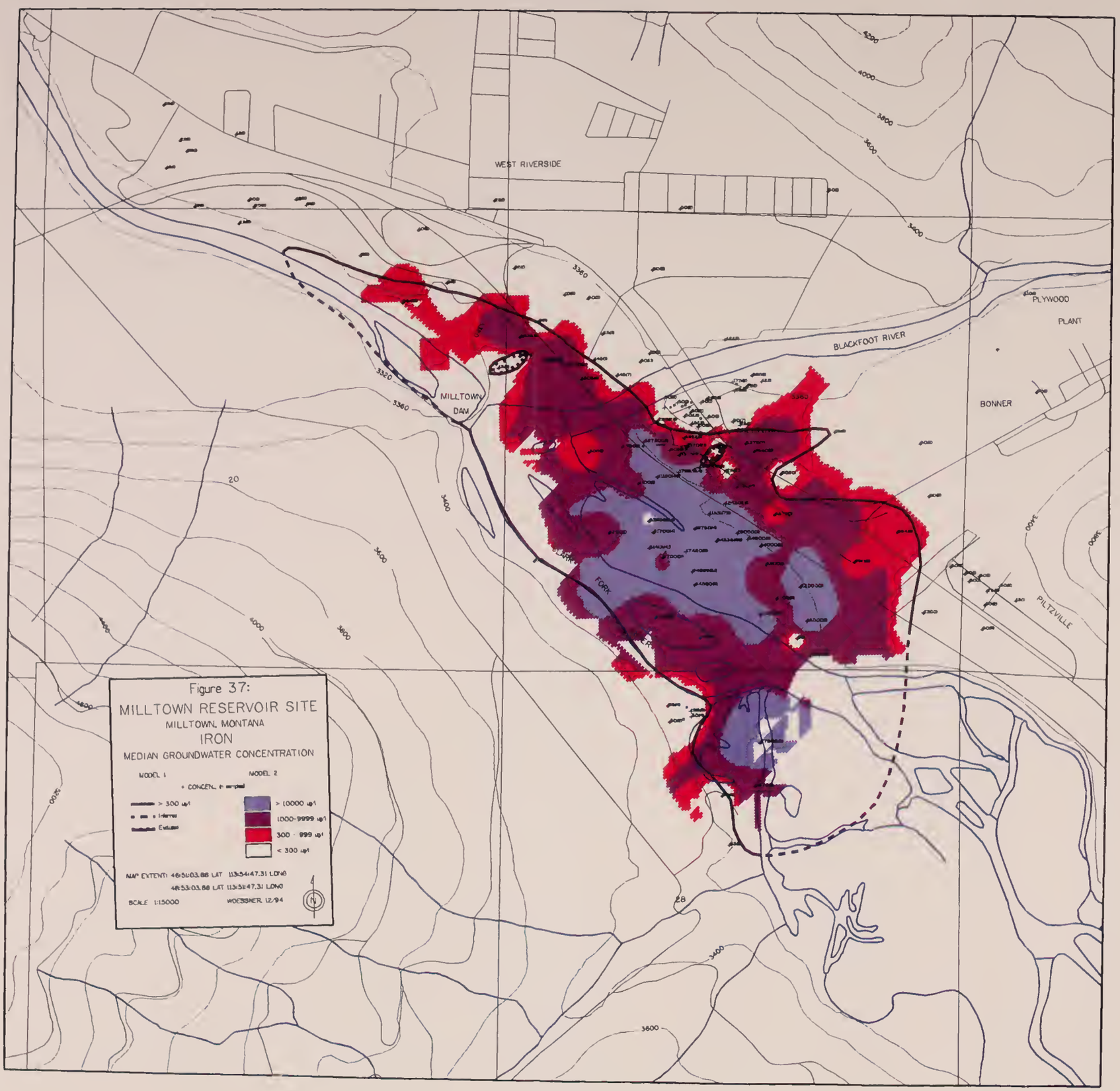
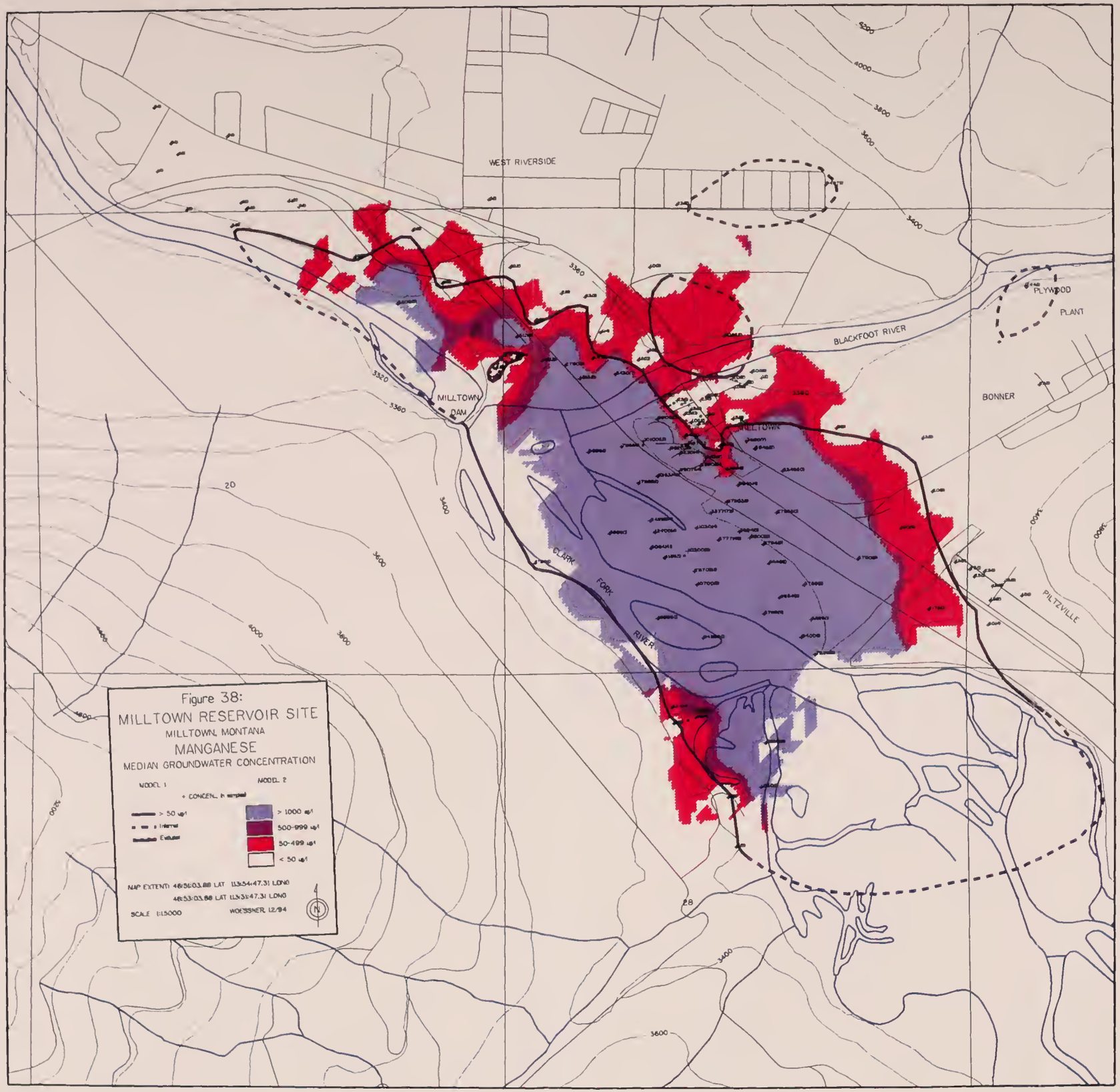


Figure 35: Location of groundwater samples used to represent baseline water quality conditions (solid dots). Scale is 1" = 2,112'(prepared form USGS 7.5' Quadrangle sheets). indicated by solid dots, also see Plate 1).


WEST RIVERSIDE
PLYWOOD
PLANT
BLACKFOOT RIVER
MILLTOWN
DAM
MILLTOWN
BONNER
PILTZVILLE
RIVER
3360
3400
3600
3800
4000
4200
3320
20
28
Figure 36:
MILLTOWN RESERVOIR SITE
MILLTOWN, MONTANA
ARSENIC
MEDIAN GROUNDWATER CONCENTRATION
MODEL 1
MODEL 2
> 1000 ug/l
500-999 ug/l
50-499 ug/l
< 50 ug/l
MAP EXTENT: 46°51'03.68" LAT 113°54'47.31" LONG
46°53'03.68" LAT 113°51'47.31" LONG
SCALE 1:15000
WOESSNER 12/94
N


WEST RIVERSIDE
PLYWOOD
PLANT
BLACKFOOT RIVER
MILLTOWN
DAM
BONNER
PIETZVILLE
FORK
3200
3400
3600
4000
4200
3360
3320
20
28
Figure 37:
MILLTOWN RESERVOIR SITE
MILLTOWN, MONTANA
IRON
MEDIAN GROUNDWATER CONCENTRATION
MODEL 1
MODEL 2
> 300 ug/l
Inferred
Evident
> 10000 ug/l
1000-9999 ug/l
300 - 999 ug/l
< 300 ug/l
MAP EXTENT: 46°53'03.88" LAT 113°54'47.31" LONG
46°53'03.88" LAT 113°53'47.31" LONG
SCALE 1:15000
WOESSNER 12/94
N


WEST RIVERSIDE
PLYWOOD
PLANT
BLACKFOOT RIVER
BONNER
MILLTOWN DAM
MILLTOWN
CLARK FORK RIVER
PILTZVILLE
3360
3320
3400
3600
4000
3800
20
28
Figure 38:
MILLTOWN RESERVOIR SITE
MILLTOWN, MONTANA
MANGANESE
MEDIAN GROUNDWATER CONCENTRATION
MODEL 1
MODEL 2
> 1000 ug/l
500-999 ug/l
50-499 ug/l
< 50 ug/l
MAP EXTENT: 46°51'03.88" LAT 113°54'47.31" LONG
46°53'03.88" LAT 113°51'47.31" LONG
SCALE 1:15000
WOESSNER 12/94
N

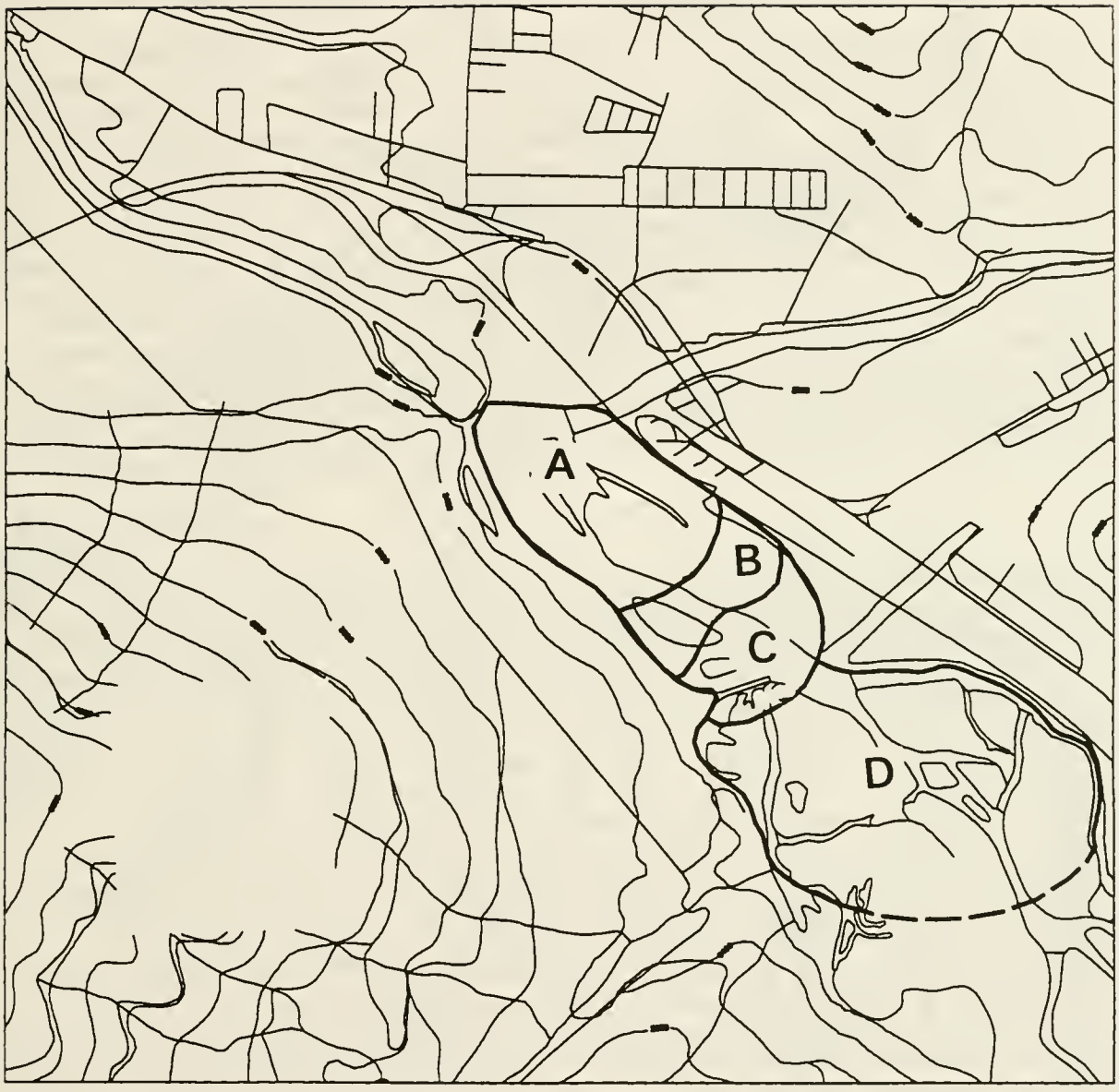


Figure 39: Isopach map of the saturated thickness in feet of the reservoir sediments. Zone A, Zone B, Zone C and Zone D are estimated to be 20 ft, 17.5 ft, 12.5 ft and 7.5 ft, respectively. (after HLA, 1987; ENSR, 1992).

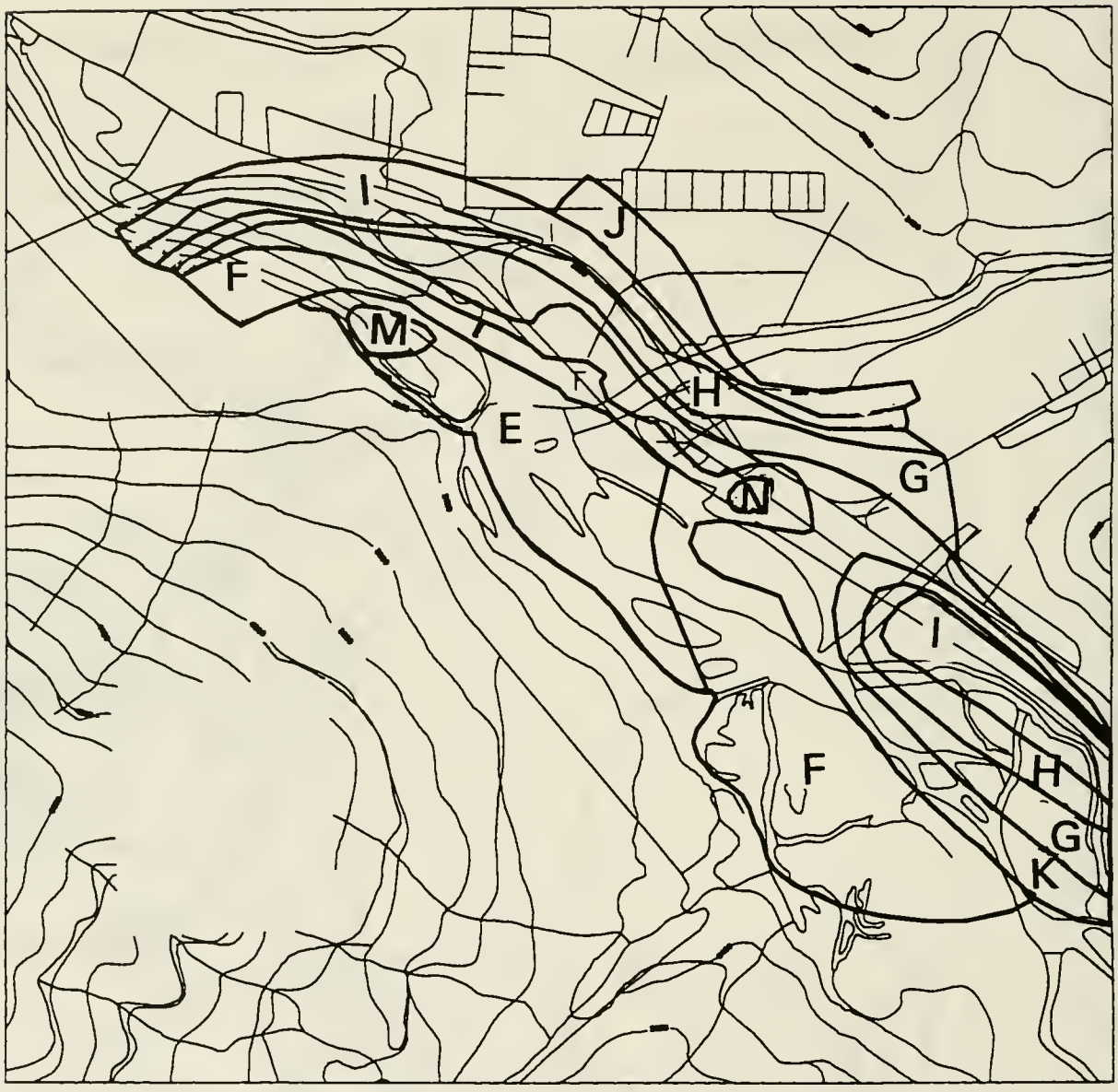


Figure 40: Isopach map of the saturated thickness in feet of the alluvial aquifer. Thickness of zones are as follows: Zone E, 20 ft; Zone F, 30 ft; Zone K, 50 ft; Zone G, 70 ft; Zone H, 90 ft; Zone I, 110 ft; Zone J, 120 ft; Zone M, 0 ft; Zone N, 20 ft. (after Titan, 1994; Schombel, 1994).

sediment volume total by porosity values of 0.30 and 0.40 (Todd, 1959), and the total volume of the coarse alluvial aquifer impacted by porosity values of 0.20 to 0.25 (Todd, 1959; Clark 1986). Results of volume calculations are presented in Table 14.

The cumulative volume of groundwater affected by one or more constituent is represented by the volume of groundwater exceeding the drinking water standard for manganese (Table 14). The mapped areas in which manganese concentrations exceed drinking water standards encompasses the mapped areas of arsenic and iron (Figures 36 and 37). Based on the results of the two methods used to estimate volumes, the total contaminated volume of groundwater at Milltown averages between 5,100 acft and 7,890 acft based on midpoint values and ranges between 4,500 acft to 8,820 acft (Table 14). This injured volume of water includes that portion of the groundwater system exceeding one or more of the drinking water standards. An additional un quantified volume of groundwater that is affected by the reservoir sediment source exceeds baseline concentrations, as defined in Table 13, yet does not exceed a Maximum Contaminant Level.

Flux of Groundwater

The rate and amount of contaminant releases from the reservoir sediments were calculated by estimating the flow of groundwater and the median concentration arsenic, iron, and manganese through a northwest to southeast cross sectional area of the alluvial aquifer immediately adjacent to the reservoir. Cross sectional areas were determined by interpreting median groundwater concentration data between well 100 and 110 (Figures 41, 42, and 43). Groundwater flow is considered perpendicular to the portion of the cross section between well 100 and 110. The part of the cross section associated with the Blackfoot River and the area to the west is generally not perpendicular to groundwater flow and was excluded from area calculations. The hydraulic gradient in the alluvial aquifer near the central portion of the cross section was calculated using water levels measured on April 18, 1991, (ENSR, 1991) at wells 101A and 904. These wells are 200 ft apart and line up parallel to the direction of groundwater flow. The hydraulic gradient was calculated to be 0.012. A mean hydraulic conductivity of 5,390 ft/d was used to represent the transmission properties of the coarse-grained aquifer. This value was obtained by averaging the values of hydraulic conductivity obtained by Woessner et al. (1984) from tests of wells 102 (3,710 ft/d), 107 (14,000 ft/d) and 103 (1950 ft/d), and an average value (1,900 ft/d) obtained from ENSR's(1992) test of well 924 located near site 105 (Titan, 1994). Darcy's law was used to calculate the groundwater discharge through each cross sectional area (Table 15).

The rate of arsenic and metal migration through each cross sectional area was estimated by calculating the median concentration for arsenic, iron and manganese for all samples of wells 100A, 100B, 101A, 101B, 102A, 102B, 103A, and 103B. The water quality data from 110A and 110B was not used as the well is

TABLE 14: Estimated Volumes in Acft of Contaminated Groundwater in the Reservoir Sediment, and the Alluvial Sand and Gravel at Milltown.

Constituent	Reservoir Sediment	Sand and Gravel	Total	Midpoint#
Arsenic				
Model1*	900-1210	1370-1710	2270-2920	2590
Model2**	620- 820	1180-1480	1800-2300	2050
Iron				
Model1	1040-1390	2850-3560	3890-4950	4420
Model2	810-1070	3990-4990	4800-6740	5570
Manganese				
Model1	1310-1750	5650-7070	6960-8820	7890
Model2	810-1080	3690-4620	4500-5700	5100

*Model1: Interpretation by the author, linear interpolation and use of hydrogeologic setting data.
**Model2: Weighted average numerical model, 1,148 ft search radius.
The midpoint was calculated by averaging the range of total values for each model.

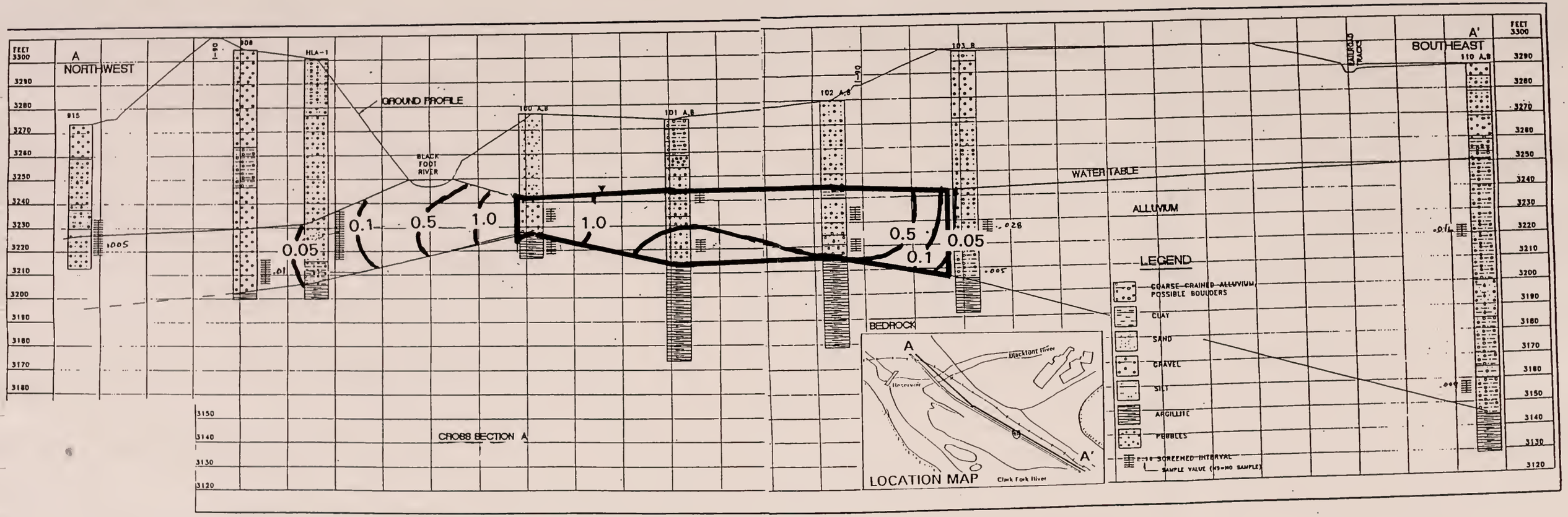


Figure 41: Northwest-southeast cross section showing the median concentration of dissolved arsenic (mg/l) and the cross sectional area (boxed in) used to calculate the discharge of arsenic contaminated groundwater from the reservoir source to the adjacent course grained sand, gravel and cobble Milltown Aquifer. The horizontal scale is 1"=400'; the vertical scale is 1"=40'(modified from ENSR, 1991).

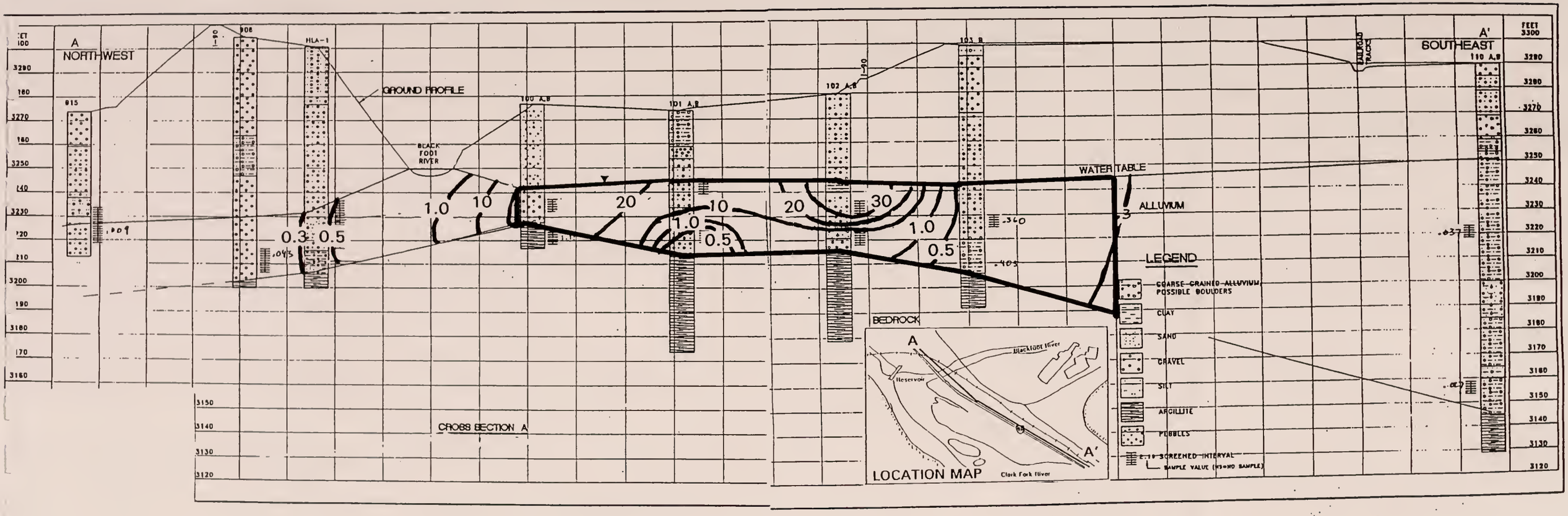


Figure 42: Northwest-southeast cross section showing the median concentration of dissolved iron (mg/l) and the cross sectional area (boxed in) used to calculate the discharge of iron contaminated groundwater from the reservoir source to the adjacent course grained sand, gravel and cobble Milltown Aquifer. The horizontal scale is 1"=400'; the vertical scale is 1"=40'(modified from ENSR, 1991).

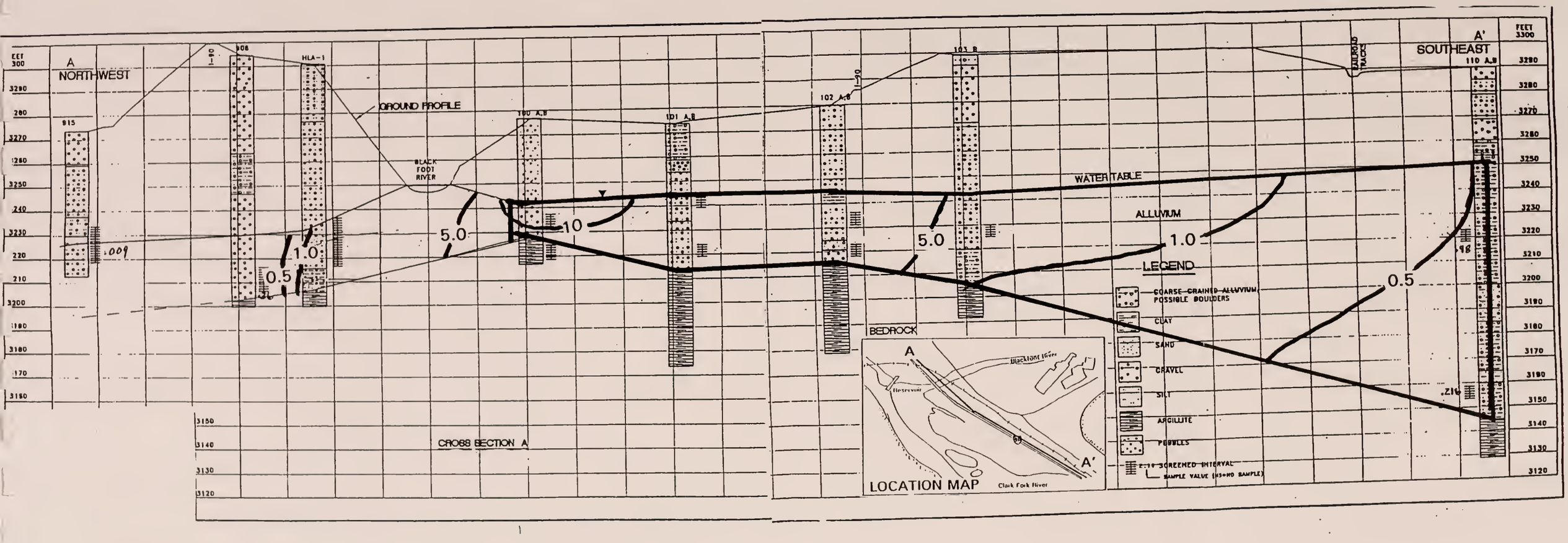


Figure 43: Northwest-southeast cross section showing the median concentration of dissolved manganese (mg/l) and the cross sectional area (boxed in) used to calculate the discharge of manganese contaminated groundwater from the reservoir source to the adjacent course grained sand, gravel and cobble Milltown Aquifer. The horizontal scale is 1"=400'; the vertical scale is 1"=40'(modified from ENSR, 1991).

TABLE 15: The Discharge of Groundwater Exceeding Primary and Secondary Maximum Contaminant Levels for the Arsenic and Metals Originating in the Contaminated Fine-Grained Reservoir Sediments and Flowing to the Coarse-Grained Alluvial Aquifer Underlying Milltown. The Hydraulic Conductivity is 5,390 ft/d and the Gradient is 0.012.

Constituent	Cross Sectional Area (ft^2) (based on median concentrations)	Discharge to the Milltown Aquifer (ft^3/d) ((acft/y))
Arsenic	31,200	2,018,020 (16,910)
Iron	58,200	3,764,380 (31,540)
Manganese	204,800	13,246,460 (110,990)

not immediately adjacent to the reservoir sediments and concentrations may not be representative of the groundwater leaving the contaminated sediment. These median concentrations were multiplied by the estimate of discharge passing through their respective cross sectional areas, and the pounds of metals and arsenic leaving the source area were determined (Table 16). These data imply that reservoir source and associated groundwater system contaminate the adjacent Milltown groundwater system with over 19 tons of arsenic, 647 tons of iron and 1,250 tons of manganese annually.

In an attempt to evaluate the percentage of the mass flux through a similar uncontaminated cross section of the coarse-grained aquifer, the discharges presented in Table 15 were multiplied by the baseline water quality concentrations presented in Table 13 (Table 17). The increase of arsenic and metal flux over baseline flux is presented in Table 16. The reservoir source of contaminants creates a flow of groundwater to the Milltown Aquifer that is elevated with concentrations of arsenic, iron and manganese that are 280, 400 and 830 times baseline mass flux rates, respectively.

RECOVERABILITY

Contamination of the groundwater underlying the Milltown Reservoir and the adjacent sand and gravel aquifer is a result of the mobilization of the arsenic and metals from the contaminated fine-grained reservoir sediments. Over 6 million cubic yards of contaminated sediments are currently trapped behind Milltown Dam. Titan (1994) attempted to estimate the available arsenic that could be removed from the reservoir sediments if their geochemical model is valid and reservoir stage and groundwater flux into the underlying alluvium remain constant. Titan's (1994) " potentially available" arsenic is estimated at 570 tons and based on their estimates of flux from the reservoir sediments releases could persist for 100's of years. Their work most likely underestimates available arsenic and hazardous constituent volumes as sediment stratigraphy is complex and difficult to accurately characterize. In addition, sediment sources up-stream are also highly contaminated and natural migration of sediments downstream continues to add contaminated sediments to the reservoir.

Migration of the hazardous constituents into the alluvial aquifer will also continue for hundreds of years as the source is unlikely to be eliminated. Apparent increases in arsenic concentrations since 1983-1984 sampling shown in Table 11 implies current geochemical models may underestimate long term impacts.

Unless remediated, contaminated sediments and impacted surface water will continue to enter the reservoir for hundreds to thousands of years. The complex stratigraphy, hence the poorly defined location and quantity of contaminants, and the continual

TABLE 16: Mass flux of Arsenic and Metals from the Milltown Reservoir to the Alluvial Groundwater System. Median Values for Groundwater from Wells 100(AB), 101(AB), 102(AB),and 103(AB) Were Rank Ordered by Concentration of a Constituent and Median Concentration Values Determined.

Constituent	median conc (mg/l)	lb/day	Times Increase Over Baseline Discharge
Arsenic	0.835	105	280
Iron	15.16	3550	400
Manganese	8.33	6860	830

TABLE 17: Mass Flux of Arsenic, Iron, and Manganese for Groundwater Represented by Baseline Concentrations (Table 13) through the Cross Sectional Areas (Table 15).

Constituent	Median conc (mg/l)	lb/day
Arsenic	0.003	0.4
Iron	0.038	8.9
Manganese	0.010	8.2

addition of contaminated sediments from up- stream make the identification of remedation strategies difficult. The presence and continual supply of the hazardous material, the natural geochemical process releasing arsenic and metals, and the reservoir driven groundwater flow system make it extremely difficult to intercept the plume. Thus, the system will remain contaminated and continually contribute to the contamination of the adjacent aquifer for hundreds of years.

SUMMARY AND CONCLUSIONS

Groundwater originating in and emanating from the Milltown Reservoir sediments is contaminated with arsenic, iron and manganese. The source of contamination affecting drinking water quality in Milltown is the fine grained reservoir sediments that contain tons of arsenic and metals. These contaminants are released from the sediments by geochemical mechanisms related to variations of the oxidation state, sediment chemistry and reservoir operation. Between 4,500 and 8,820 acft of contaminated groundwater currently occupies the sediments in the Milltown area. Over 110,990 acft of contaminated groundwater flows from the reservoir to the adjacent sand and gravel aquifer annually. The large volume of the source (over 6 million cubic yards) the complex distribution of the wastes, the presence of the Milltown Dam, the types of geochemical reactions controlling the release of the contaminants, and the continual accumulation of arsenic and metal laden wastes in the reservoir make reclamation, mitigation and recovery extremely difficult and costly, if attainable. Without remediation, the groundwater system will remain contaminated for hundreds to thousands of years to come.

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APPENDIX A

Bedrock Contour and Alluvial Thickness Maps

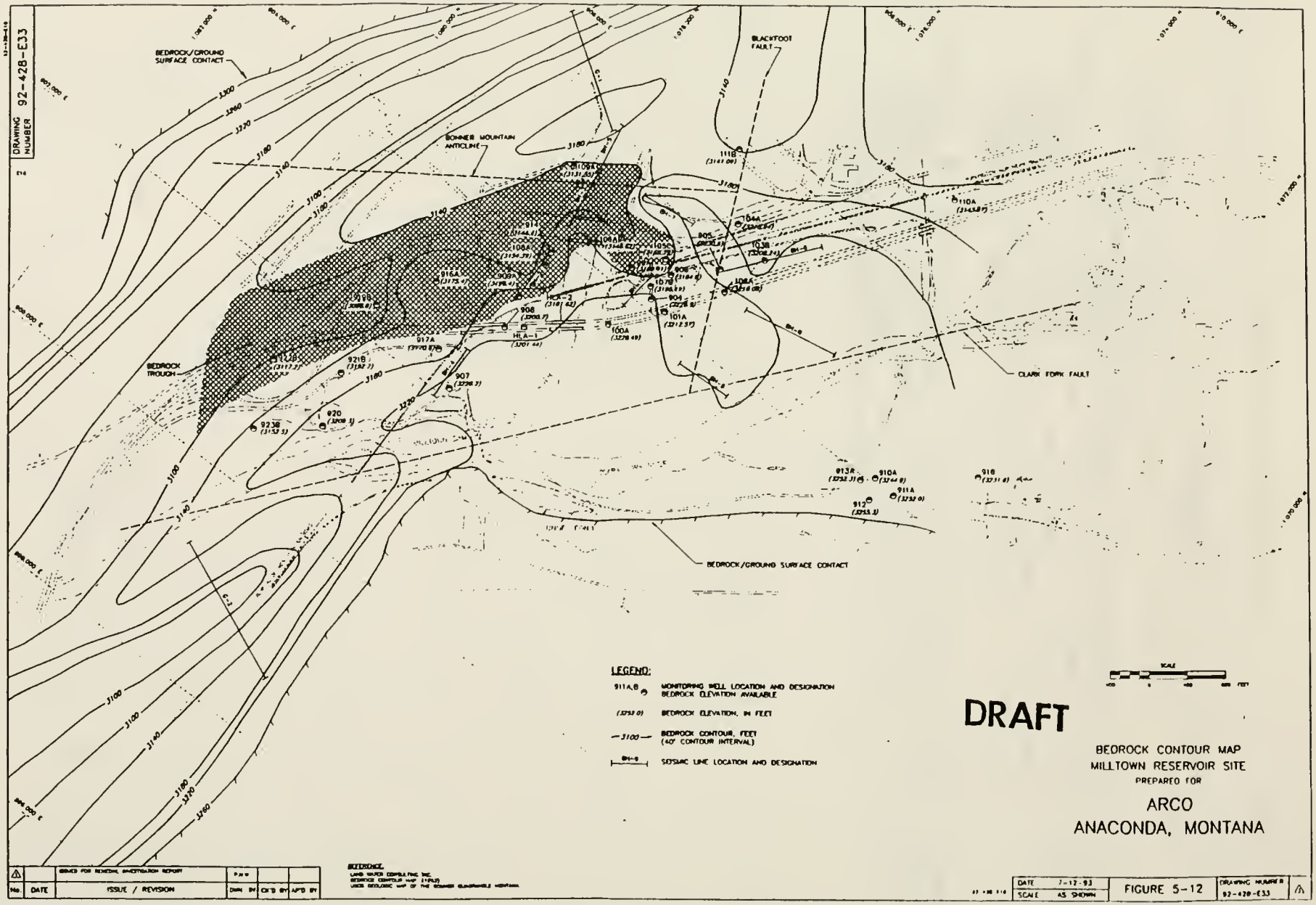

Figure A1: Bedrock contour map (Titan, 1994).

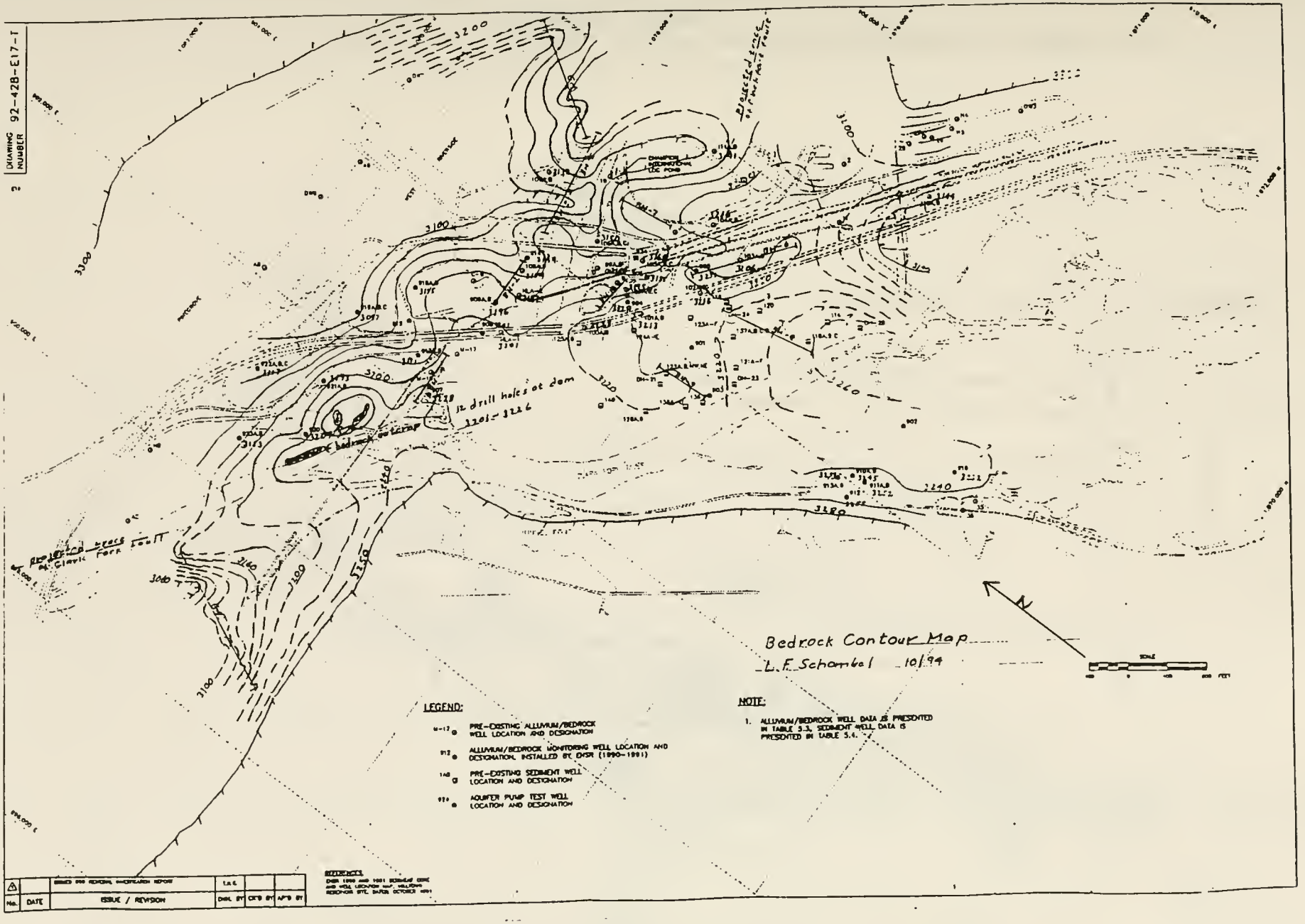
DRAWING NUMBER 92-428-E17-1
Bedrock Contour Map
L.F. Schombel 10/94
N
LEGEND:
PRE-EXISTING ALLUVIUM/BEDROCK WELL LOCATION AND DESIGNATION
ALLUVIUM/BEDROCK MONITORING WELL LOCATION AND DESIGNATION, INSTALLED BY EMSI (1990-1991)
PRE-EXISTING SEDIMENT WELL LOCATION AND DESIGNATION
AQUIFER PUMP TEST WELL LOCATION AND DESIGNATION
NOTE:
1. ALLUVIUM/BEDROCK WELL DATA IS PRESENTED IN TABLE 5.3, SEDIMENT WELL DATA IS PRESENTED IN TABLE 5.4.
12 drill holes at dam
3201-3226
Bedrock outcrop
Bedrock trace of Clavic Farm fault
DATE
ISSUE / REVISION

Figure A2: Bedrock contour map (Schombel, 1994).

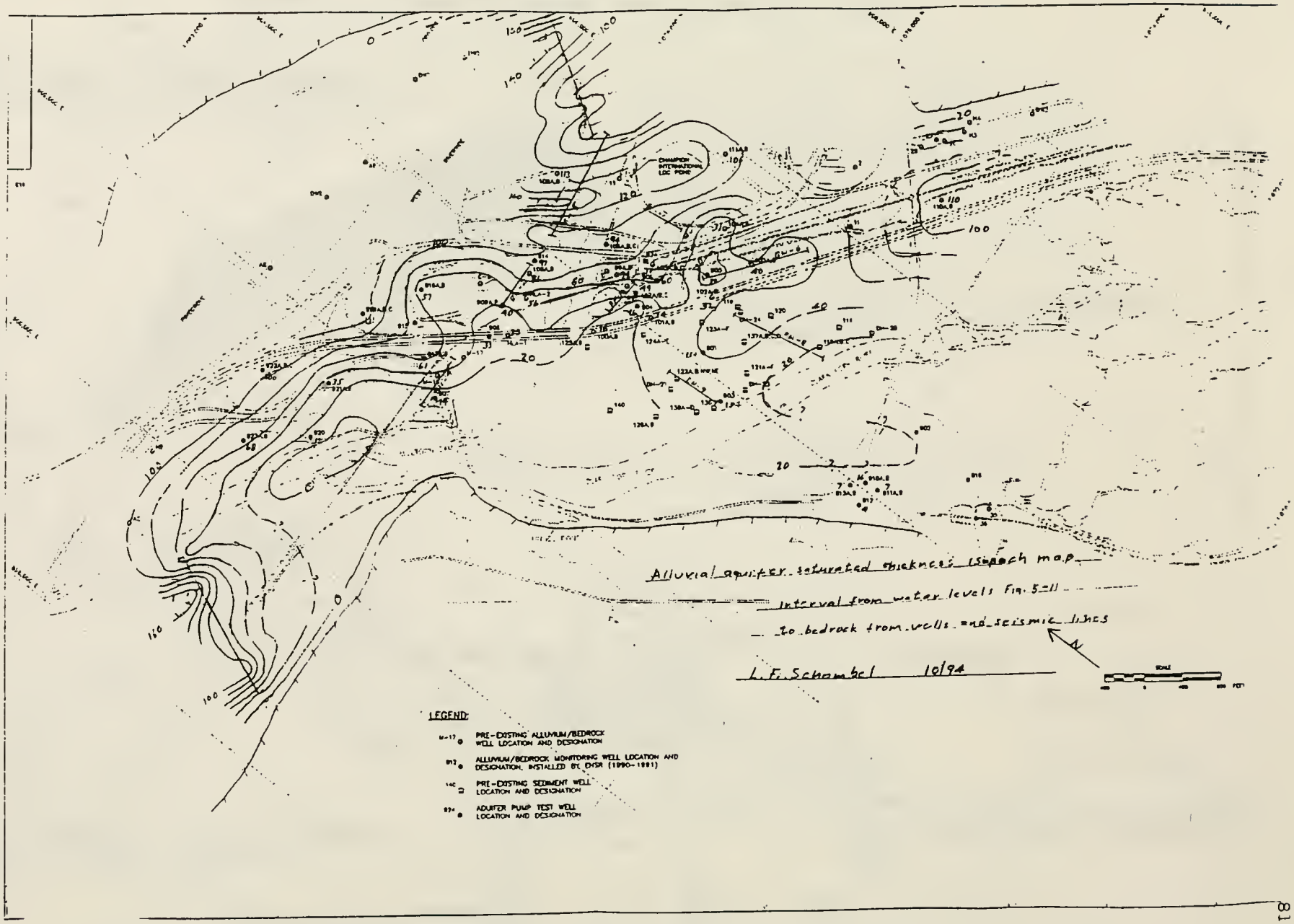
Alluvial aquifer saturated thickness isopach map
interval from water levels Fig. 5-11
to bedrock from wells and seismic lines
L.F. Schombel 10/94
LEGEND:
PRE-EXISTING ALLUVIUM/BEDROCK WELL LOCATION AND DESIGNATION
ALLUVIUM/BEDROCK MONITORING WELL LOCATION AND DESIGNATION, INSTALLED BY DWSR (1990-1991)
PRE-EXISTING SEDIMENT WELL LOCATION AND DESIGNATION
AQUIFER PUMP TEST WELL LOCATION AND DESIGNATION

Figure A3: Alluvial aquifer saturated thickness isopach map (Schombel, 1994).

APPENDIX B

Milltown Water Quality Data

APPENDIX B

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
2	12/1/81	13.0		200.0		180.0		100.0	Woessner, et. al, 19
2	4/1/82	9.0		100.0		190.0			unless otherwise
2	1/31/83	8.9		691.0		100.0			indicated.
2	3/24/83	15.0		896.0		0.0			
2	5/8/83	11.0		564.0		0.0			
2	7/13/83	11.0		301.0		290.0			
2	8/31/83	6.9		625.0		299.0			
2	10/19/83	5.0			NA		NA		
2	11/29/83	4.2		1000.0		180.0			
2	3/23/84	8.0		452.0		230.0			
2	6/27/84		NA		NA		NA		
3	12/1/81	5.0		0.0		15.0			
3	8/31/83	1.1		0.0		0.0			
6	5/18/81	350.0		0.0		14000.0		75.0	
6	6/30/81	190.0			NA	9200.0			
6	7/6/81	150.0			NA	8400.0			
6	7/8/81	150.0			NA	8600.0			
6	8/28/81	220.0			NA		NA		
6	9/30/81	140.0			NA		NA		
6	10/26/81	260.0			NA		NA		
6	11/2/81	370.0			NA		NA		
6	11/9/81	0.2			NA		NA		
6	12/17/81	388.0		200.0		9900.0			
6	4/1/82	540.0		180.0		8650.0			
6	10/21/82	294.0		227.0		7320.0			
6	12/3/82	296.0		460.0		7420.0			
6	2/1/83	157.0		64.0		5730.0			
6	3/24/83	283.0		0.0		6160.0			
6	3/31/83	274.0		364.0			NA		
6	4/8/83	283.0		345.0			NA		
6	4/17/83	299.0		412.0			NA		
6	4/23/83	389.0		388.0		5520.0			
6	5/7/83	436.0		572.0		8640.0			
6	5/17/83	473.0		431.0			NA		
6	5/25/83	373.0		457.0		8330.0			
6	6/1/83	234.0		296.0			NA		
6	6/14/83	144.0		130.0		7980.0			
6	6/23/83	150.0		421.0			NA		
6	7/1/83	113.0		330.0		5550.0			
6	7/8/83	167.0		153.0			NA		
6	7/13/83	204.0		227.0		6580.0			
6	7/20/83	247.0		34.0			NA		
6	8/30/83	261.0		708.0		7697.0			
6	9/21/83	165.0		381.0			NA		
6	10/5/83	153.0		201.0		5394.0			
6	10/20/83	138.0			NA		NA		
6	11/28/83	182.0		260.0		5780.0			
6	1/26/84	7.2		0.0		4000.0			
6	2/21/84	8.8		0.0		3770.0			
6	3/21/84	110.0		172.0		5700.0			
6	4/24/84		NA	620.0		6600.0			
6	6/27/84		NA		NA		NA		
7	11/9/81	0.0			NA		NA	90.0	
7	12/1/81	60.0		800.0		50.0			
7	12/1/81	30.0		200.0		15.0			
7	12/1/81	30.0		200.0		15.0			
7	10/21/82	25.0		428.0		92.0			
7	12/3/82	22.0		592.0		169.0			
7	2/1/83	33.0		464.0		76.0			

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
7	3/24/83	20.0		604.0		68.0			
7	5/8/83	33.0		778.0		915.0			
7	7/13/83	23.0		1100.0		867.0			
7	8/30/83	27.0		102.0		54.0			
7	9/21/83	27.3		828.0			NA		
7	10/5/83	27.0		40.0		121.0			
7	10/20/83	31.0			NA		NA		
7	11/29/83	16.0		1100.0		1280.0			
8	11/2/81	39.0			NA		NA	63.0	
8	12/1/81	396.0		800.0		6900.0			
8	12/17/81	510.0		1050.0		6870.0			
8	4/1/82	390.0		100.0		7250.0			
8	10/21/82	182.0		24.0		3520.0			
8	12/3/82	333.0		58.0		12890.0			
8	2/1/83	215.0		389.0			NA		
8	3/24/83	283.0		98.0		6260.0			
8	4/23/83	544.0		1300.0		7660.0			
8	5/7/83	291.0		537.0		6820.0			
8	5/24/83	297.0		353.0		6800.0			
8	6/1/83	240.0		403.0			NA		
8	6/14/83	234.0		545.0		5710.0			
8	6/23/83	199.0		687.0			NA		
8	7/1/83	237.0		625.0		6510.0			
8	7/8/83	230.0		230.0			NA		
8	7/13/83	153.0		611.0		6310.0			
8	8/20/83	129.0		423.0			NA		
8	8/30/83	112.0		502.0		8197.0			
8	9/21/83	184.0		258.0			NA		
8	10/5/83	31.0		1300.0		8694.0			
8	10/20/83	364.0			NA		NA		
8	3/21/84	58.0		1960.0		5500.0			
8	6/27/84		NA		NA		NA		
9	11/2/81	380.0			NA		NA	62.0	
9	12/1/82	440.0		1300.0		15.0			
9	4/1/82	510.0		9140.0		6980.0			
9	10/21/82	703.0		11000.0		6310.0			
9	12/3/82	658.0		18000.0		8290.0			
9	1/31/83	613.0		24000.0		6330.0			
9	3/24/83	632.0		17000.0		7800.0			
9	3/31/83	747.0		14000.0			NA		
9	4/8/83	770.0		9400.0			NA		
9	4/17/83	726.0		16000.0			NA		
9	4/23/83	825.0		14000.0		8550.0			
9	5/8/83	761.0		11000.0		6410.0			
9	5/17/83	470.0		12000.0			NA		
9	5/25/83	544.0		9000.0		5100.0			
9	6/1/83	619.0		9200.0			NA		
9	6/14/83	570.0		11000.0			NA		
9	6/23/83	317.0		12000.0		6430.0			
9	7/1/83	570.0		12000.0			NA		
9	7/8/83	458.0		12000.0		6080.0			
9	7/13/83	530.0		12000.0		7870.0			
9	7/20/83	805.0		12000.0		10000.0			
9	8/30/83	527.0		9500.0		8197.0			
9	9/21/83	552.0		8900.0		8398.0			
9	10/5/83	518.0		11000.0		6594.0			
9	10/5/83	554.0		9900.0		6594.0			
9	10/20/83	527.0			NA		NA		
9	11/30/83	104.0		12000.0		6780.0			
9	1/26/84	590.0		12930.0		7300.0			

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
9	3/23/84	690.0		12960.0		7300.0			
9	4/24/84	620.0		13000.0		7500.0			
9	6/27/84		NA		NA		NA		
10	12/1/81	224.0		100.0		15.0		89.0	
10	4/1/82	310.0		0.0		20.0			
10	10/21/82	205.0		322.0		39.0			
10	12/3/82	218.0		136.0		8.0			
10	1/31/83	294.0			NA	30.0			
10	3/24/83	226.0			NA	53.0			
10	4/17/83	138.0		945.0			NA		
10	4/23/83	167.0		82.0		626.0			
10	5/8/83	146.0		107.0		564.0			
10	5/17/83	141.0		461.0			NA		
10	5/23/83	144.0		55.0		637.0			
10	6/1/83	136.0		173.0			NA		
10	6/14/83	170.0		62.0		983.0			
10	6/23/83	165.0		73.0			NA		
10	7/1/83	213.0		651.0		413.0			
10	7/8/83	192.0		24.0			NA		
10	7/13/83	201.0		5.0		28.0			
10	7/20/83	252.0		24.0			NA		
10	8/30/83	172.0		21.0		645.0			
10	9/21/82	241.0		16.0			NA		
10	10/5/83	169.0		5.0		294.0			
10	10/20/83	209.0			NA		NA		
10	11/28/83	116.0		25.0		209.0			
10	3/23/84	180.0		72.0		160.0			
10	6/27/84		NA		NA		NA		
11	11/2/81	26.0		1800.0		3300.0		55.0	
11	4/1/82	11.0		910.0		2830.0			
11	1/31/83	20.0		754.0		2730.0			
11	5/8/83	20.0		890.0		27.0			
11	7/13/83	18.0		603.0		2730.0			
11	8/30/83	15.0		1000.0		2997.0			
11	9/21/83	12.0		656.0			NA		
11	10/20/83	18.0		600.0		2187.0			
11	11/1/83	22.0		1500.0		2480.0			
17	12/1/81	5.0		0.0		30.0		96.0	
17	4/1/82	22.0		25.0		0.0			
17	3/24/83	0.0		0.0		0.0			
17	5/8/83	0.0		0.0		0.0			
17	8/31/83	0.0		0.0		0.0			
17	9/22/83	0.0		0.0			NA		
17	10/19/83	0.0			NA		NA		
17	11/29/83	0.0		0.0		0.0			
18	12/1/81	5.0		300.0		15.0		71.5	
18	8/30/83	0.0		0.0		0.0			
19	12/1/81	5.0		0.0		15.0		80.0	
19	4/1/82	0.0		25.0		0.0			
19	7/13/83	0.0		23.0		8.0			
19	8/30/83	0.0		0.0		0.0			
19	3/23/84	0.0		0.0		0.0			
19	6/27/84	0.0		0.0		0.0			
20	12/1/81	4.5		0.0		15.0		70.0	
20	5/8/83	5.2		0.0		0.0			
20	7/13/83	4.8		61.0		5.0			

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
20	9/1/83	4.0		129.0		1.0			
20	9/22/83	4.6		170.0			NA		
20	10/19/83	2.5			NA		NA		
21	9/1/83	1.7		5.0		1.0		86.0	
23	12/1/81	5.0		50.0		60.0		53.5	
23	9/1/83	0.6		0.0		0.0			
23	6/22/86	ND		ND		2.5			HLA 1987
24	9/1/83	0.7		0.0		1.0		64.7	
25	9/1/83	0.6		11.0		1.0		91.0	
26	9/1/83	1.2		0.0		1.0		83.0	
27	9/1/83	1.0		0.0		1.0		27.0	
28	4/1/82	2.0		25.0		5.0		74.5	
28	9/1/83	1.6		5.0		0.0			
29	8/31/83	0.5		11.0		2497.0		125.0	
30	8/11/83	0.0		0.0		5.0		95.0	
30	8/31/83	1.1		0.0		1.0			
35	11/29/83	0.0		80.0		0.0			
35-1	9/26/90	3.0	UW	59.2	B	5.6			ENSR 5/91
35-2	9/27/90	3.0	UW	60.8	B	6.5	B		ENSR 5/91
35-3	9/27/90	3.0	UW	63.2	B	10.2	B		ENSR 5/91
035	06/07/91	2.0	U	22.5		5.8			Titan, 1994
36	11/29/83	0.0		25.0		0.0			
36	6/22/86	ND		ND		2.5			HLA 1987
36-1	9/26/90	3.0	U	8.0	U	4.6	B		ENSR 5/91
36-2	9/27/90	3.0	UW	8.0	U	9.3	B		ENSR 5/91
36-3	9/28/90	3.0	UW	613.0		33.5			ENSR 5/91
036	06/07/91	2.0	U	20.0	U	9.2			Titan, 1994
99A	1/26/84	0.0		0.0		162.0		115.2	
99A	2/21/84	0.0		0.0		0.0			
99A	3/20/84	0.0		0.0		0.0			
99A	5/3/84	0.0		0.0		0.0			
99A-1	10/3/90	3.0	U	8.0	U	483.0		110.1	ENSR 5/91
099A	06/11/91	2.1		31.9		478.0			Titan, 1994
99B	1/26/84	0.0		0.0		0.0			
99B	2/24/83	0.0		0.0		0.0			
99B	3/20/84	0.0		0.0		0.0		78.7	
99B	5/3/84	0.0		0.0		0.0			
99B-1	10/2/90	3.0	UW	8.0	U	7.5	U	73.7	ENSR 5/91
099B	06/11/91	2.0	U	20.0	U	1.9			Titan, 1994
100A	12/2/83	29.0		400.0		298.0		58.4	
100A	6/17/86	1400.0		20000.0		11000.0			HLA 1987
100A	10/1/90	1250.0		20600.0		8960.0	N	53.4	ENSR 5/91
100A	06/16/91	1010.0		21600.0		9080.0			Titan, 1994
100A	10/15/91	1140.0		23000.0		9850.0			Titan, 1994
100A	06/02/92	1110.0		23000.0		9900.0			Titan, 1994
100B	12/1/83	412.0		560.0		3280.0		44.3	

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
100B	6/17/86	1400.0		20000.0		10000.0			HLA 1987
100B-1	10/1/90	1500.0		22500.0		10200.0	N	39.3	ENSR 5/91
100B	06/16/91	1260.0		24500.0		10500.0			Titan, 1994
100B	10/15/91	1450.0		24700.0		10500.0			Titan, 1994
100B	06/02/92	1300.0		24500.0		10600.0			Titan, 1994
101A	12/2/83	145.0		25.0		5680.0		6.4	
101B	8/16/83	704.0		17000.0		10997.0		35.1	
101B	9/21/83	746.0		13000.0		9998.0			
101B	10/5/83	737.0		19000.0		9894.0			
101B	10/21/83	708.0		15000.0		9587.0			
101B	12/1/83	634.0		15000.0		8780.0			
101B	1/27/84	884.0		22920.0		9362.0			
101B	2/21/84	860.0		16940.0		9080.0			
101B	3/21/84	861.0		17870.0		9490.0			
101B	5/3/84	823.0		17860.0		9920.0			
101B-1	10/2/90	1070.0		20400.0		11400.0	N	30.1	ENSR 5/91
101B	06/16/91	976.0		2500.0		11500.0			Titan, 1994
101B	10/15/91	941.0	J	24000.0		11800.0			Titan, 1994
101B	06/03/92	974.0		19800.0		10800.0			Titan, 1994
102A	12/1/83	631.0		8400.0		5980.0		61.7	
102A	6/16/86	660.0		9000.0		54000.0			HLA 1987
102A-1	10/2/90	828.0		11600.0		6760.0	N	56.7	ENSR 5/91
102A	06/15/91	874.0		11400.0		6130.0			Titan, 1994
102A	10/15/91	805.0		12200.0		6740.0			Titan, 1994
102A	06/03/92	829.0		13500.0		7120.0			Titan, 1994
102B	12/1/83	621.0		12000.0		5880.0		48.9	
102B	1/27/84	974.0		19920.0		6632.0			
102B	2/21/84	1100.0		27940.0		6880.0			
102B	3/21/84	771.0		38870.0		5990.0			
102B	5/3/84	853.0		41860.0		6320.0			
102B	6/16/86	520.0		7600.0		6000.0			HLA 1987
102B-1	10/2/90	829.0		12900.0		7060.0	N	43.9	ENSR 5/91
102B	06/15/91	806.0		17200.0		7380.0			Titan, 1994
102B	10/15/91	1010.0		18500.0		7780.0			Titan, 1994
102B	06/03/92	1070.0		20400.0		8380.0			Titan, 1994
103A	11/29/83	0.0		700.0		980.0		89.6	
103A	6/18/86	7.0		110.0		700.0			HLA 1987
103A	10/15/91	42.6	J	413.0		2630.0			Titan, 1994
103B	11/29/83	24.0		200.0		2280.0		75.5	
103B	3/20/84	0.0		340.0		2090.0			
103B	6/18/86	32.0		720.0		2900.0			HLA 1987
103B-1	10/3/90	47.0		380.0		3230.0		70.4	ENSR 5/91
103B	06/15/91	42.4		972.0		3110.0			Titan, 1994
103B	10/18/91	49.9		1420.0		3560.0			Titan, 1994
103B	06/02/92	57.9		1210.0		3410.0			Titan, 1994
104A-1	10/1/90	8.5	BN	8.0	U	2430.0	N	95.7	ENSR 5/91
104A	06/13/91	8.7		20.0	U	2250.0			Titan, 1994
104A	06/13/91	7.6		20.0	U	2290.0			Titan, 1994
104B	11/28/83	16.3		200.0		3080.0		84.6	
104B	1/26/84	4.0		0.0		2162.0			
104B	2/21/84	16.0		186.0		3080.0			
104B	3/20/84	0.0		110.0		3490.0			
104B	5/3/84	10.0		0.0		3720.0			
104B-1	10/1/90	11.6	N	8.0	U	2500.0	N	79.6	ENSR 5/91

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
104B	06/13/91	11.6		20.0	U	2590.0			Titan, 1994
105A	11/28/83	0.0		0.0		928.0		124.0	
105A-1	10/4/90	7.7	B	8.0	U	916.0		118.9	ENSR 5/91
105A	06/11/91	2.6		20.0	U	970.0			Titan, 1994
105B	11/28/83	0.7		2.5		0.0		94.2	
105B	1/26/84	0.0		0.0		0.0			
105B	2/21/84	0.0		0.0		44.0			
105B	3/20/84	0.0		0.0		0.0			
105B	5/3/84	0.0		0.0		0.0			
105B-1	10/4/90	3.5	B	11.2	B	4.3	B	89.1	ENSR 5/91
105B	06/11/91	2.0	U	20.0	U	2.4			Titan, 1994
105C	11/28/83	0.0		0.0		780.0		72.2	
105C-1	10/3/90	3.0	U	8.0	U	67.0		67.1	ENSR 5/91
105C	06/11/91	2.0	U	20.0	U	1.0	U		Titan, 1994
106A	10/18/83	0.0		5.0		99.0		121.1	
106A	11/30/83	0.0		25.0		280.0			
106A	1/30/84	0.0		397.0		0.0			
106A	2/23/84	0.0		0.0		0.0			
106A	3/20/84	0.0		0.0		40.0			
106A	6/20/86	ND		ND		7.0			HLA 1987
106A-1	10/4/90	3.0	U	32.1	B	15.4		116.0	ENSR 5/91
106A	06/11/91	2.0	U	20.0	U	2.4			Titan, 1994
106B	10/18/83	0.0		0.0		120.0		112.2	
106B	11/30/83	7.0		0.0		0.0			
106B	6/20/86	ND		ND		2.5			HLA 1987
106B-1	10/2/90	3.0	UW	8.0	U	7.5	U	69.8	ENSR 5/91
106B	06/12/91	2.0	U	20.0	U	1.5			Titan, 1994
106C	10/18/83	0.0		0.0		41.0			
106C	11/30/83	0.0		0.0		0.0		105.0	
106C	6/13/86	2.0		ND		7.0			HLA 1987
106C-1	10/2/90	3.0	UW	8.0	U	7.5	U	100.0	ENSR 5/91
106C	06/12/91	2.0	U	20.0	U	2.9			Titan, 1994
107A	10/18/83	105.0		300.0		4187.0			
107A	11/29/83	211.0		3200.0		4780.0		95.1	
107A	3/20/84	54.0		1070.0		3290.0			
107A	6/19/86	ND		5100.0		4700.0			HLA 1987
107B	10/18/83	0.0		27.0		487.0			
107B	11/29/83	0.0		800.0		380.0		119.1	
107B	6/19/86	8.0		ND		170.0			HLA 1987
107B-1	10/3/90	4.8	B	15300.0		6670.0		114.0	ENSR 5/91
107B	06/13/91	2.0	U	56.3		104.0			Titan, 1994
107B	10/15/91	2.9	J	19.7		106.0			Titan, 1994
107B	10/15/91	3.5	J	99.4		104.0			Titan, 1994
107B	06/02/92	2.2		27.0		89.1			Titan, 1994
107C	10/19/83	766.0		7000.0		4987.0			
107C	11/29/83	23.0		240.0		2280.0		70.9	
107C	3/20/84	361.0		3470.0		4890.0			
107C	6/16/86	48.0		490.0		1900.0			HLA 1987
107C-1	10/3/90	1450.0		15300.0		6670.0		65.8	ENSR 5/91
107C	08/09/91	556.0		9280.0		5690.0			Titan, 1994
107C	10/15/91	1260.0	J	12300.0		6770.0			Titan, 1994
107C	06/02/92	331.0		6360.0		5340.0			Titan, 1994
107C	06/02/92	377.0		6450.0		5430.0			Titan, 1994

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
108A	10/19/83	0.0		0.0		120.0			
108A	12/2/83	0.0		0.0		0.0		96.1	
108A	6/19/86	ND		90.0		140.0			HLA 1987
108A-1	9/29/90	3.0	UN	30.0	B	7.5	UN	91.9	ENSR 5/91
108A	06/09/91	2.0	U	20.0	U	2.4			Titan, 1994
108B	10/19/83	25.0		5.0		0.0			
108B	12/2/83	0.7		25.0		0.0		44.9	
108B	3/20/84	0.0		0.0		0.0			
108B	6/17/86	ND		ND		12.0			HLA 1987
108B-1	9/29/90	3.0	UN	8.0	U	3.3	B	39.9	ENSR 5/91
108B	06/09/91	2.0	U	20.0	U	1.0	U		Titan, 1994
109A	10/19/83	2.5		30.0		487.0		133.9	
109A	12/2/83	0.7		25.0		5.0			
109A	6/21/86	ND		ND		2.5			HLA 1987
109A-1	10/2/90	3.0	UN	179.0		1120.0		120.8	ENSR 5/91
109B	10/19/83	0.0		50.0		487.0			
109B	12/2/83	0.7		240.0		580.0		98.1	
109B	1/26/84	0.0		0.0		262.0			
109B	2/21/84	0.0		0.0		226.0			
109B	3/20/84	0.0		0.0		40.0			
109B	5/3/84	0.0		0.0		355.0			
109B-1	10/2/90	4.0	B	32.8	B	7.5	U	93.0	ENSR 5/91
109B	06/09/91	2.0	U	380.0		1310.0			Titan, 1994
110A	11/30/83	1.4		25.0		422.0			
110A	3/20/84	0.0		0.0		0.0		136.2	
110A	6/20/86	7.0		ND		11.0			HLA 1987
110A-1	10/6/90	5.8	B	20.9	B	825.0		131.1	ENSR 5/91
110A	06/13/91	2.0	U	20.0	U	3.4			Titan, 1994
110B	11/28/83	10.0		25.0		980.0			
110B	3/20/84	0.0		0.0		10.0		70.5	
110B	6/20/86	15.0		ND		1200.0			HLA 1987
110B-1	10/6/90	17.5		8.0	U	4.9	B	65.5	ENSR 5/91
110B	06/13/91	14.0		20.0	U	840.0			Titan, 1994
111A	11/28/83	0.7		150.0		0.0			
111A	3/21/84	0.0		0.0		0.0		143.1	
111A-1	10/3/90	3.0	U	8.0	U	7.5	U	138.0	ENSR 5/91
111A	06/11/91	2.0	U	20.0	U	2.4			Titan, 1994
111B	11/23/83	0.7		25.0		0.0			
111B	3/21/84	0.0		0.0		0.0		88.9	
111B-1	10/3/90	3.0	U	8.0		3.0		82.9	ENSR 5/91
111B	06/11/91	2.0	U	20.0	U	1.0	U		Titan, 1994
113	9/22/83	397.0		3800.0		9098.0			
113	10/7/83	268.0		1200.0		6894.0		9.1	
113	10/20/83	431.0			NA		NA		
114	9/22/83	81.3		1200.0		5998.0			
114	10/7/83	104.0		2600.0		4694.0		9.5	
114	10/20/83	78.0			NA		NA		
114	6/12/86	88.0		1700.0		1100.0			HLA 1987
115	9/22/83	56.4		14000.0		9998.0			
115	10/7/83	29.0		19000.0		9794.0		9.5	
115	10/20/83		NA		NA		NA		

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Screen Depth	REFERENCE
115	11/18/83	38.0	8300.0	7786.0		
116	9/22/83	153.0	10000.0	3998.0		
116	10/7/83	134.0	11000.0	3594.0	10.2	
116	11/18/83	101.0	8800.0	3386.0		
117	11/16/83	19.0	12000.0	8286.0		
118A	11/14/83	110.0	4100.0	3786.0	10.5	
118A	6/10/86	250.0	32000.0	6300.0		HLA 1987
118B	11/14/83	256.0	14000.0	3586.0	12.0	
119A	11/16/83	322.0	18000.0	5786.0	8.0	
119A	6/14/86	116.0	24000.0	61000.0		HLA 1987
119B	11/16/83	5100.0	23000.0	3186.0		
120	11/14/83	32.0	3300.0	8586.0	14.2	
121A	11/16/83	214.0	22000.0	6086.0	6.0	
121A	1/27/84	260.0	32930.0	7900.0	13.5	
121A	2/23/84	220.0	30930.0	7970.0		
121A	3/21/84	160.0	34960.0	8300.0		
121A	4/27/84	270.0	34000.0	8000.0		
121A	6/11/86	210.0	32000.0	8200.0		HLA 1987
121A	9/21/86	360.0	29109.0	8281.0	15.8	UDALOY 1988
121A	10/19/86	370.0	30761.0	8643.2		UDALOY 1988
121A	11/15/86	440.0	31040.0	8365.6		UDALOY 1988
121A	1/31/87	280.0	30921.0	8761.3		UDALOY 1988
121A	2/28/87	280.0	28165.0	8463.0		UDALOY 1988
121A	3/30/87	310.0	29999.0	8337.0		UDALOY 1988
121B	11/16/83	24.0	14000.0	8786.0		
121B	2/24/84	20.0	62930.0	8770.0	7.0	
121B	3/21/84	19.0	19960.0	9000.0		
121B	4/23/87	BDL	4297.0	8304.0	8.6	UDALOY 1988
121B	5/16/87	BDL	9900.0	9387.6		UDALOY 1988
121B	6/15/87	BDL	11181.0	9259.5		UDALOY 1988
121B	7/14/87	40.0	12704.0	9519.5		UDALOY 1988
121B	8/14/87	20.0	9825.0	9703.3		UDALOY 1988
121D	8/9/86	90.0	1206.0	4203.5	11.6	UDALOY 1988
121D	8/15/86	50.0	BDL	4003.5		UDALOY 1988
121D	4/23/87	70.0	12146.0	4405.0		UDALOY 1988
121D	5/16/87	50.0	12842.0	5104.5		UDALOY 1988
121D	6/15/87	BDL	11941.0	5379.4		UDALOY 1988
121D	7/14/87	40.0	12004.0	5666.5		UDALOY 1988
121D	8/14/87	60.0	15194.0	5310.2		UDALOY 1988
121E	8/9/86	110.0	21603.0	4165.5	14.5	UDALOY 1988
121E	8/15/86	90.0	22036.0	4162.5		UDALOY 1988
121E	9/21/86	120.0	25008.0	4252.0		UDALOY 1988
121E	10/19/86	120.0	26011.0	4187.1		UDALOY 1988
121E	11/15/86	120.0	26248.0	4181.6		UDALOY 1988
121E	1/31/87	180.0	28281.0	4950.3		UDALOY 1988
121E	2/28/87	130.0	23725.0	4949.7		UDALOY 1988
121E	3/30/87	190.0	26201.0	4837.0		UDALOY 1988
121E	4/23/87	140.0	28044.0	4345.9		UDALOY 1988
121E	5/16/87	120.0	28371.0	4444.4		UDALOY 1988
121E	6/15/87	130.0	27201.0	4044.3		UDALOY 1988
121E	7/14/87	140.0	27154.0	4230.4		UDALOY 1988

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Screen Depth	REFERENCE
121E	8/14/87	160.0	27373.0	4153.1		UDALOY 1988
121F	8/9/86	150.0	20224.0	9430.5	17.5	UDALOY 1988
121F	8/15/86	140.0	22114.0	9709.5		UDALOY 1988
121F	10/19/86	240.0	28000.0	10283.0		UDALOY 1988
121F	11/15/86	280.0	27646.0	9984.6		UDALOY 1988
121F	1/31/87	220.0	26491.0	9330.4		UDALOY 1988
121F	2/28/87	160.0	20236.0	9029.4		UDALOY 1988
121F	3/30/87	200.0	21908.0	9096.0		UDALOY 1988
121F	4/23/87	200.0	27713.0	8784.8		UDALOY 1988
121F	5/16/87	190.0	27471.0	8717.3		UDALOY 1988
121F	6/15/87	190.0	24961.0	7862.2		UDALOY 1988
121F	7/14/87	200.0	24714.0	7770.4		UDALOY 1988
121F	8/14/87	200.0	24363.0	7686.1		UDALOY 1988
121F	9/21/86	200.0	24986.0	9867.0		UDALOY 1988
122A	11/16/83	3700.0	22000.0	4886.0		
122A	1/27/84	6200.0	55930.0	5500.0	4.0	
122A	2/24/84	7000.0	59930.0	5470.0		
122A	3/21/84	7300.0	63960.0	5800.0		
122A	4/27/84	6600.0	61000.0	5500.0		
122A	6/14/86	5000.0	55000.0	6000.0		HLA 1987
122A	8/15/86	6000.0	58170.0	5667.2	16.7	UDALOY 1988
122A	9/21/86	6200.0	5932.0	5514.0		UDALOY 1988
122A	10/19/86	6000.0	54058.0	5408.3		UDALOY 1988
122A	11/15/86	6930.0	56574.0	5555.6		UDALOY 1988
122A	1/31/87	6900.0	58814.0	5530.2		UDALOY 1988
122A	2/28/87	6220.0	55653.0	5560.3		UDALOY 1988
122A	3/30/87	7270.0	58336.0	5517.6		UDALOY 1988
122A	4/23/87	6070.0	58709.0	5482.9		UDALOY 1988
122A	5/16/87	5830.0	60451.0	5640.2		UDALOY 1988
122A	6/15/87	5950.0	60317.0	5504.7		UDALOY 1988
122A	7/14/87	5640.0	59434.0	5348.1		UDALOY 1988
122A	8/14/87	5850.0	59440.0	5372.2		UDALOY 1988
122A-1	10/4/90	6350.0	61600.0	5730.0	13.2	ENSR 5/91
122A	06/16/91	4980.0	63000.0	5870.0		Titan, 1994
122B	11/16/83	10.0	28000.0	2786.0		
122B	1/27/84	89.0	28930.0	13000.0	7.0	
122B	2/24/84	210.0	58930.0	12970.0		
122B	3/21/84	94.0	59960.0	13000.0		
122B	4/27/84	100.0	59000.0	12000.0		
122B	8/15/86	BDL	10090.0	13578.4	8.6	UDALOY 1988
122B	4/23/87	BDL	24907.0	13386.8		UDALOY 1988
122B	5/16/87	BDL	43649.0	14763.2		UDALOY 1988
122B	6/15/87	BDL	46206.0	14048.7		UDALOY 1988
122B	7/14/87	BDL	41703.0	12324.1		UDALOY 1988
122B	8/14/87	BDL	29269.0	11973.1		UDALOY 1988
122D	8/15/86	BDL	2467.0	5059.7	11.6	UDALOY 1988
122D	9/21/86	60.0	3465.0	4245.0		UDALOY 1988
122D	10/19/86	100.0	7378.0	4445.1		UDALOY 1988
122D	11/15/86	430.0	22262.0	4764.0		UDALOY 1988
122D	1/31/87	120.0	24719.0	4446.9		UDALOY 1988
122D	2/28/87	150.0	17953.0	4440.4		UDALOY 1988
122D	3/30/87	80.0	46906.0	4413.9		UDALOY 1988
122D	4/23/87	80.0	54744.0	4509.7		UDALOY 1988
122D	5/16/87	130.0	58556.0	4702.9		UDALOY 1988
122D	6/15/87	150.0	60185.0	4917.6		UDALOY 1988
122D	7/14/87	140.0	56543.0	4651.1		UDALOY 1988
122D	8/14/87	170.0	53618.0	4708.1		UDALOY 1988

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Screen Depth	REFERENCE
122E	9/21/86	3550.0	48252.0	3428.0	14.6	UDALOY 1988
122E	10/19/86	3920.0	49037.0	3240.0		UDALOY 1988
122E	11/15/86	4430.0	51132.0	3231.3		UDALOY 1988
122E	1/31/87	2850.0	46144.0	3713.6		UDALOY 1988
122E	2/28/87	2620.0	47873.0	3782.5		UDALOY 1988
122E	3/30/87	3040.0	52626.0	3843.1		UDALOY 1988
122E	4/23/87	2470.0	49712.0	3641.8		UDALOY 1988
122E	5/16/87	2580.0	51958.0	3723.8		UDALOY 1988
122E	6/15/87	2890.0	55274.0	3832.5		UDALOY 1988
122E	7/14/87	2480.0	46773.0	3535.1		UDALOY 1988
122E	8/14/87	2820.0	51368.0	3590.1		UDALOY 1988
123A	11/17/83	5500.0	20000.0	3286.0		
123A	1/27/84	8500.0	37930.0	3000.0	13.1	
123A	2/23/84	9500.0	40930.0	1970.0		
123A	3/21/84	10000.0	45960.0	3100.0		
123A	4/27/84	9300.0	44000.0	2900.0		
123A	6/14/86	3900.0	14000.0	3700.0		HLA 1987
123A	11/15/86	8490.0	23247.0	3669.6	16.7	UDALOY 1988
123A	12/15/86	9050.0	26854.0	3665.1		UDALOY 1988
123A	1/31/87	9120.0	24751.0	3726.5		UDALOY 1988
123A	2/28/87	8130.0	22856.0	3718.1		UDALOY 1988
123A	3/30/87	8780.0	26249.0	3534.0		UDALOY 1988
123A	4/23/87	9370.0	39402.0	3297.6		UDALOY 1988
123A	5/16/87	9250.0	42033.0	3377.0		UDALOY 1988
123A	6/15/87	9800.0	43151.0	3297.1		UDALOY 1988
123A	7/14/87	9590.0	42743.0	3267.4		UDALOY 1988
123A	8/14/87	9920.0	43862.0	3250.0		UDALOY 1988
123B	11/18/83	2200.0	41000.0	3686.0		
123B	1/27/84	3400.0	44930.0	3300.0	7.5	
123B	2/23/84	4700.0	52930.0	2970.0		
123B	3/21/84	4900.0	55960.0	3200.0		
123B	4/27/84	4500.0	55000.0	3100.0		
123B	4/23/87	3140.0	57580.0	3104.5	12.5	UDALOY 1988
123B	5/16/87	3110.0	57222.0	3159.1		UDALOY 1988
123B	6/15/87	3130.0	56168.0	3044.1		UDALOY 1988
123B	7/14/87	2950.0	51663.0	3071.3		UDALOY 1988
123B	8/14/87	3540.0	57832.0	3088.9		UDALOY 1988
123C	11/18/83	22.0	7800.0	7836.0	7.2	UDALOY 1988
123C	4/23/87	BDL	2647.0	14116.4		UDALOY 1988
123C	5/16/87	BDL	7147.0	16508.1		UDALOY 1988
123C	6/15/87	BDL	7696.0	20173.1		UDALOY 1988
123C	7/14/87	BDL	1965.0	25384.3		UDALOY 1988
123C	8/14/87	10.0	1152.0	31726.8		UDALOY 1988
123D	8/9/86	4670.0	25365.0	3054.5	17.6	UDALOY 1988
123D	8/15/86	5790.0	31533.0	3067.5		UDALOY 1988
123D	9/21/86	5470.0	30785.0	2559.0		UDALOY 1988
123D	10/19/86	7490.0	39879.0	2723.0		UDALOY 1988
123D	11/15/86	5970.0	26075.0	3054.5		UDALOY 1988
123D	1/31/87	4030.0	11531.0	2624.5		UDALOY 1988
123D	2/28/87	4820.0	20466.0	3028.8		UDALOY 1988
123D	3/30/87	3680.0	17156.0	2897.0		UDALOY 1988
123D	4/23/87	7460.0	40237.0	3309.4		UDALOY 1988
123D	5/16/87	7970.0	42648.0	3736.2		UDALOY 1988
123D	6/15/87	8560.0	43825.0	3709.2		UDALOY 1988
123D	7/14/87	8360.0	43936.0	3555.7		UDALOY 1988
123D	8/14/87	9220.0	47860.0	3655.7		UDALOY 1988

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Screen Depth	REFERENCE
123E	8/9/86	1430.0	63645.0	3456.3	13.2	UDALOY 1988
123E	9/21/86	1510.0	64243.0	3344.0		UDALOY 1988
123E	8/15/86	710.0	52931.0	3539.5		UDALOY 1988
123E	10/19/86	1280.0	64366.0	3477.9		UDALOY 1988
123E	11/15/86	1610.0	62864.0	3387.5		UDALOY 1988
123E	12/15/86	1710.0	70372.0	3530.9		UDALOY 1988
123E	1/31/87	2050.0	71099.0	3420.4		UDALOY 1988
123E	2/28/87	1440.0	64715.0	3433.8		UDALOY 1988
123E	3/30/87	1750.0	69424.0	3418.0		UDALOY 1988
123E	4/23/87	1630.0	67280.0	3126.2		UDALOY 1988
123E	5/16/87	1680.0	71366.0	3309.2		UDALOY 1988
123E	6/15/87	1900.0	70383.0	3217.2		UDALOY 1988
123E	7/14/87	1690.0	69206.0	3206.7		UDALOY 1988
123E	8/14/87	1560.0	73420.0	3372.6		UDALOY 1988
123F	8/9/86	1730.0	69734.0	3509.1	13.2	UDALOY 1988
123F	8/15/86	1500.0	62132.0	3425.5		UDALOY 1988
123F	9/21/86	1710.0	68472.0	3523.0		UDALOY 1988
123F	10/19/86	1880.0	64126.0	3651.9		UDALOY 1988
123F	11/15/86	1930.0	63192.0	3603.4		UDALOY 1988
123F	12/15/86	1680.0	69970.0	3764.8		UDALOY 1988
123F	1/31/87	2410.0	73797.0	3688.3		UDALOY 1988
123F	2/28/87	1420.0	61693.0	3668.4		UDALOY 1988
123F	3/30/87	1900.0	71631.0	3623.0		UDALOY 1988
123F	4/23/87	1930.0	66329.0	3105.2		UDALOY 1988
123F	5/16/87	1990.0	71094.0	3356.3		UDALOY 1988
123F	6/15/87	2170.0	69332.0	3190.3		UDALOY 1988
123F	7/14/87	2130.0	70453.0	3267.6		UDALOY 1988
123F	8/14/87	1840.0	75179.0	3476.5		UDALOY 1988
124	11/17/83	5.0	4000.0	11986.0	5.5	
124A	4/23/87	580.0	39341.0	8544.2	8.4	UDALOY 1988
124A	5/16/87	720.0	53146.0	8181.9		UDALOY 1988
124A	6/15/87	730.0	54103.0	7790.4		UDALOY 1988
124A	7/14/87	770.0	49465.0	6158.5		UDALOY 1988
124A	8/14/87	810.0	45497.0	5464.1		UDALOY 1988
						UDALOY 1988
124B	8/15/86	1200.0	10251.0	2375.9	8.3	UDALOY 1988
124B	3/30/87	3330.0	21637.0	2106.4		UDALOY 1988
124B	4/23/87	3940.0	44889.0	2675.1		UDALOY 1988
124B	5/16/86	5400.0	46675.0	2.3		UDALOY 1988
124B	6/15/87	6700.0	48832.0	2196.3		UDALOY 1988
124B	7/14/87	6370.0	43544.0	1871.5		UDALOY 1988
124B	8/14/87	6510.0	44137.0	1828.1		UDALOY 1988
124C	8/15/86	1310.0	29060.0	9034.9	11.5	UDALOY 1988
124C	9/21/86	390.0	43542.0	13918.0		UDALOY 1988
124C	10/19/86	1130.0	37076.0	11164.8		UDALOY 1988
124C	11/15/86	820.0	43771.0	13855.4		UDALOY 1988
124C	1/31/87	500.0	48016.0	15405.2		UDALOY 1988
124C	2/28/87	740.0	47103.0	15336.7		UDALOY 1988
124C	3/30/87	530.0	50408.0	15829.6		UDALOY 1988
124C	4/23/87	520.0	47077.0	14405.9		UDALOY 1988
124C	5/16/87	640.0	45695.0	13597.9		UDALOY 1988
124C	6/15/87	550.0	45251.0	988.3		UDALOY 1988
124C	7/14/87	540.0	43843.0	13554.4		UDALOY 1988
124C	8/14/87	450.0	45427.0	14453.0		UDALOY 1988
124D	9/21/86	250.0	38472.0	10888.0	14.5	UDALOY 1988
124D	10/19/86	180.0	37307.0	11314.9		UDALOY 1988

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Screen Depth	REFERENCE
124D	11/15/86	240.0	31871.0	9952.4		UDALOY 1988
124D	1/31/87	150.0	36635.0	10825.1		UDALOY 1988
124D	2/28/87	130.0	39922.0	11736.7		UDALOY 1988
124D	3/30/87	350.0	49558.0	13847.7		UDALOY 1988
124D	4/23/87	190.0	45415.0	13625.8		UDALOY 1988
124D	5/16/87	220.0	41571.0	12257.1		UDALOY 1988
124D	6/15/87	210.0	41519.0	12308.3		UDALOY 1988
124D	7/14/87	240.0	40313.0	11984.3		UDALOY 1988
124D	8/14/87	190.0	41245.0	12233.2		UDALOY 1988
124E	8/15/86	240.0	16049.0	5372.7	17.5	UDALOY 1988
124E	9/21/86	270.0	12891.0	5512.0		UDALOY 1988
124E	10/19/86	530.0	29689.0	5247.0		UDALOY 1988
124E	11/15/86	890.0	35940.0	5337.5		UDALOY 1988
124E	1/31/87	1080.0	34910.0	4924.1		UDALOY 1988
124E	2/28/87	540.0	27852.0	4787.7		UDALOY 1988
124E	3/30/87	840.0	29579.0	4680.9		UDALOY 1988
124E	4/23/87	930.0	35253.0	4822.6		UDALOY 1988
124E	5/16/87	1000.0	36370.0	4677.0		UDALOY 1988
124E	6/15/87	1140.0	37619.0	4780.4		UDALOY 1988
124E	7/14/87	1020.0	37062.0	4631.3		UDALOY 1988
124E	8/14/87	1000.0	41114.0	5243.3		UDALOY 1988
125	11/17/83	31.0	2500.0	7986.0	5.5	
126	11/16/83	106.0	300.0	5686.0	6.8	
127	11/16/83	11.0	4100.0	17986.0	5.5	
128	11/16/83	26.0	6200.0	5886.0	6.0	
129	11/18/83	446.0	21.0	1786.0	5.0	
130	11/18/83	15.0	2000.0	16896.0	5.5	
131	11/18/83	20.0	1150.0	24986.0	5.5	
136	11/16/83	40.0	6700.0	4186.0	5.5	
137A	8/15/86	70.0	208.0	3673.5	8.5	UDALOY 1988
137A	4/23/87	BDL	537.5	10866.2		UDALOY 1988
137A	5/16/87	BDL	18268.0	14313.3		UDALOY 1988
137A	6/15/87	40.0	28810.0	17953.4		UDALOY 1988
137A	7/14/87	80.0	26163.0	15864.1		UDALOY 1988
137A	8/14/87	60.0	22478.0	16436.4		UDALOY 1988
137B	8/9/86	70.0	414.0	3848.6	12.0	UDALOY 1988
137B	8/15/86	50.0	2375.0	3799.5		UDALOY 1988
137B	9/21/86	150.0	9280.0	3211.0		UDALOY 1988
137B	10/19/86	230.0	10725.0	3164.9		UDALOY 1988
137B	11/15/86	420.0	18053.0	3120.1		UDALOY 1988
137B	12/15/86	2740.0	45868.0	3753.6		UDALOY 1988
137B	1/31/87	210.0	10380.0	3002.2		UDALOY 1988
137B	2/28/87	100.0	3837.0	2618.1		UDALOY 1988
137B	3/30/87	390.0	20563.0	3136.2		UDALOY 1988
137B	4/23/87	740.0	34306.0	3181.1		UDALOY 1988
137B	5/16/87	830.0	36447.0	3179.3		UDALOY 1988
137B	6/15/87	880.0	34730.0	3036.4		UDALOY 1988
137B	7/14/87	950.0	34316.0	2897.1		UDALOY 1988
137B	8/14/87	1040.0	36448.0	3079.4		UDALOY 1988
137C	8/9/86	420.0	135.0	4402.9	16.0	UDALOY 1988

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Screen Depth	REFERENCE
137C	9/21/86	130.0	41.0	2633.0		UDALOY 1988
137C	10/19/86	270.0	439.0	2217.8		UDALOY 1988
137C	11/15/86	1300.0	7718.0	2553.9		UDALOY 1988
137C	1/31/87	2870.0	20345.0	2492.9		UDALOY 1988
137C	2/28/87	2690.0	15846.0	2346.6		UDALOY 1988
137C	3/30/87	1000.0	4423.0	2106.3		UDALOY 1988
137C	4/23/87	3850.0	36785.0	2978.1		UDALOY 1988
137C	5/16/87	4590.0	43616.0	3015.4		UDALOY 1988
137C	6/15/87	5420.0	44771.0	2930.4		UDALOY 1988
137C	7/14/87	5120.0	44706.0	2622.8		UDALOY 1988
137C	8/14/87	5710.0	46307.0	2838.3		UDALOY 1988
137D	8/9/86	5790.0	35821.0	5239.4	18.6	UDALOY 1988
137D	8/15/86	5600.0	34343.0	5302.5		UDALOY 1988
137D	9/21/86	6840.0	39041.0	5373.0		UDALOY 1988
137D	10/19/86	7200.0	39744.0	5580.8		UDALOY 1988
137D	11/15/86	8130.0	44703.0	5645.8		UDALOY 1988
137D	12/15/86	7020.0	40186.0	5716.4		UDALOY 1988
137D	1/31/87	7750.0	44200.0	5822.3		UDALOY 1988
137D	2/28/87	6780.0	37667.0	5647.4		UDALOY 1988
137D	3/30/87	8190.0	44996.0	5773.4		UDALOY 1988
137D	4/23/87	6900.0	50133.0	6055.1		UDALOY 1988
137D	5/16/87	6880.0	50305.0	6121.4		UDALOY 1988
137D	6/15/87	7060.0	50051.0	5974.5		UDALOY 1988
137D	7/14/87	7120.0	49845.0	5823.7		UDALOY 1988
137D	8/14/87	7440.0	51756.0	6143.2		UDALOY 1988
138A	8/15/86	200.0	2582.0	6009.6	8.5	UDALOY 1988
138A	4/23/87	BDL	11772.0	58156.0		UDALOY 1988
138A	5/16/87	50.0	19333.0	55866.0		UDALOY 1988
138A	6/15/87	70.0	25029.0	48938.4		UDALOY 1988
138A	7/14/87	80.0	19404.0	46013.6		UDALOY 1988
138A	8/14/87	40.0	12494.0	43093.5		UDALOY 1988
138B	8/15/86	70.0	566.0	3944.4	12.9	UDALOY 1988
138B	9/21/86	230.0	2955.0	3920.0		UDALOY 1988
138B	10/19/86	200.0	1107.0	3867.2		UDALOY 1988
138B	11/15/86	370.0	6510.0	4330.5		UDALOY 1988
138B	1/31/87	110.0	997.0	4027.1		UDALOY 1988
138B	2/28/87	60.0	287.0	4608.7		UDALOY 1988
138B	3/30/87	600.0	11310.0	5399.0		UDALOY 1988
138B	4/23/87	2500.0	51592.0	5828.7		UDALOY 1988
138B	5/16/87	2520.0	52221.0	6084.0		UDALOY 1988
138B	6/15/87	2620.0	51419.0	55814.0		UDALOY 1988
138B	7/14/87	2790.0	51463.0	5578.6		UDALOY 1988
138B	8/14/87	2750.0	49753.0	5429.6		UDALOY 1988
138C	9/21/86	4080.0	57621.0	5081.0	14.5	UDALOY 1988
138C	10/19/86	4050.0	57091.0	4868.4		UDALOY 1988
138C	11/15/86	4660.0	58080.0	5162.6		UDALOY 1988
138C	1/31/87	4690.0	61500.0	5226.0		UDALOY 1988
138C	2/28/87	4230.0	60461.0	50977.0		UDALOY 1988
138C	3/30/87	4850.0	63052.0	50957.0		UDALOY 1988
138C	4/23/87	4470.0	65892.0	5629.7		UDALOY 1988
138C	5/16/87	4520.0	67059.0	5983.7		UDALOY 1988
138C	6/15/87	3830.0	59919.0	5173.5		UDALOY 1988
138C	7/14/87	4250.0	62281.0	5278.5		UDALOY 1988
138C	8/14/87	4480.0	61022.0	5365.8		UDALOY 1988
138D	8/15/86	2140.0	30146.0	7406.2	19.5	UDALOY 1988
138D	9/21/86	3190.0	40650.0	8726.0		UDALOY 1988
138D	10/19/86	4050.0	49953.0	10045.5		UDALOY 1988

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
138D	11/15/86	3150.0		29810.0		11855.6			UDALOY 1988
138D	1/31/87	2850.0		27660.0		12125.8			UDALOY 1988
138D	2/28/87	2030.0		19301.0		11846.0			UDALOY 1988
138D	3/30/87	5180.0		51572.0		13310.4			UDALOY 1988
138D	4/23/87	5410.0		60162.0		13965.7			UDALOY 1988
138D	5/16/87	5310.0		61057.0		14362.5			UDALOY 1988
138D	6/15/87	5500.0		59629.0		13958.5			UDALOY 1988
138D	7/14/87	5630.0		60070.0		13973.5			UDALOY 1988
138D	8/14/87	5410.0		57681.0		13394.0			UDALOY 1988
901-1	10/6/90	367.0		14800.0		10100.0		22.1	ENSR 5/91
901	06/15/91	320.0		17400.0		11200.0			Titan, 1994
901	10/15/91	415.0	J	16500.0		10900.0			Titan, 1994
901	06/03/92	412.0		17000.0		11200.0			Titan, 1994
902-1	10/6/90	21.1		6500.0		1570.0		14.0	ENSR 5/91
902	06/13/91	10.9		28300.0		4910.0			Titan, 1994
902	06/13/91	9.7		27800.0		4880.0			Titan, 1994
903-1	10/6/90	400.0		15300.0		11100.0		24.6	ENSR 5/91
903	06/15/91	382.0		17400.0		10300.0			Titan, 1994
903	06/15/91	376.0		17200.0		10200.0			Titan, 1994
903	10/15/91	555.0	J	19800.0		11100.0			Titan, 1994
903	06/03/92	612.0		21600.0		10100.0			Titan, 1994
904-1	10/4/90	666.0		7590.0		6100.0		51.5	ENSR 5/91
904	08/07/91	234.0		5100.0		3190.0			Titan, 1994
904	10/18/91	992.0		15200.0		7270.0			Titan, 1994
904	06/02/92	470.0		9290.0		4390.0			Titan, 1994
905-1	10/5/90	158.0		1480.0		3970.0		54.7	ENSR 5/91
905	06/15/91	627.0		2040.0		3320.0			Titan, 1994
905	10/18/91	178.0		3990.0		4360.0			Titan, 1994
905	06/02/92	167.0		4090.0		4130.0			Titan, 1994
906-1	10/5/90	3.5	B	8.2	B	7.5	U	92.5	ENSR 5/91
906	06/11/91	8.9		67.1		1280.0			Titan, 1994
907-1	9/27/90	3.0	UW	13.0	B	3.7	B	31.0	ENSR 5/91
907	06/07/91	2.0	U	20.0	U	1.0	U		Titan, 1994
907	10/14/91	2.0	U	12.5		3.6			Titan, 1994
907	10/14/91	2.0	U	11.0	U	1.0			Titan, 1994
907	06/01/92	1.0	U	27.0	U	3.0	U		Titan, 1994
908-1	10/1/90	16.4	N	43.5	B	360.0	N	86.5	ENSR 5/91
908	06/15/91	144.0		2790.0		2760.0			Titan, 1994
908	10/15/91	128.0		654.0		4320.0			Titan, 1994
908	10/18/91	291.0		3060.0		2940.0			Titan, 1994
908	06/01/92	135.0	J	2740.0	J	2390.0			Titan, 1994
909A-1	10/1/90	90.0	NS	412.0		4070.0		57.2	ENSR 5/91
909A	06/15/91	113.0		599.0		3740.0			Titan, 1994
909A	10/15/91	128.0		654.0		4320.0			Titan, 1994
909A	06/01/92	187.0	J	926.0	J	4300.0			Titan, 1994
909B-1	10/1/90	3.0	UN	8.0		13.6	BN	25.3	ENSR 5/91
909B	06/11/91	2.0	U	20.0	U	2.9			Titan, 1994
909B	06/11/91	2.0	U	20.0	U	2.4			Titan, 1994
909B	10/15/91	1.0	UR	11.0	U	92.2			
909B	06/02/92	1.8		27.0	U	12.4			Titan, 1994
909B	06/02/92	1.7		27.0	U	12.0			Titan, 1994

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WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
910	06/11/91	3.1		9610.0		4040.0			Titan, 1994
910A-1	9/28/90	3.0	UW	199.0		988.0		20.5	ENSR 5/91
910A	06/13/91	2.0	U	100.0		787.0			Titan, 1994
910B-1	9/28/90	5.4	B	2790.0		3940.0		7.4	ENSR 5/91
911A-1	9/29/90	3.0	UW	8.0	U	7.5	U	20.0	ENSR 5/91
911A	06/11/91	2.6		20.0	U	138.0			Titan, 1994
911B-1	9/29/90	3.0	U	118.0		330.0		9.5	ENSR 5/91
911B	06/10/91	2.0	U	20.0	U	38.8			Titan, 1994
912-1	9/28/90	3.0	UW	8.0	U	3.0	B	10.0	ENSR 5/91
912	06/10/91	2.0	U	20.0	U	1.9			Titan, 1994
913A-1	9/27/90	3.0	UW	122.0		432.0		20.3	ENSR 5/91
913A	06/11/91	2.0	U	20.0	U	16.5			Titan, 1994
913A	06/09/91	2.0	U	20.0	U	15.5			Titan, 1994
913B	06/09/91	2.0	U	2390.0		1210.0			Titan, 1994
914-1	9/28/90	3.0	U	11.3	B	3.7	B	90.0	ENSR 5/91
914	06/09/91	2.0	U	20.0	U	3.9			Titan, 1994
914	06/09/91	2.0	U	20.0	U	2.9			Titan, 1994
915-1	9/29/90	3.0	UN	8.7	B	7.5	UN	40.0	ENSR 5/91
915	06/11/91	2.0	U	20.0	U	1.9			Titan, 1994
915	10/15/91	3.2		11.0	U	3.2			Titan, 1994
915	10/15/91	3.4		11.0	U	1.9			Titan, 1994
915	06/01/92	3.1		57.5		3.0	U		Titan, 1994
916A	07/02/91	3.0	U	20.0	U	19.0			Titan, 1994
916A	10/16/91	1.0	UR	11.0	U	6.7			Titan, 1994
916A	06/01/92	1.0	UJ	27.0	U	3.0	U		Titan, 1994
916B	07/02/91	3.0	U	20.0	U	3.2			Titan, 1994
916B	10/16/91	1.0	UR	11.0	U	1.2			Titan, 1994
916B	06/01/92	2.3	J	27.0	U	3.0	U		Titan, 1994
917A	07/02/91	137.0		3410.0		2110.0			Titan, 1994
917A	07/02/91	127.0		3410.0		2110.0			Titan, 1994
917A	10/18/91	3.9		11.0	U	8.8			Titan, 1994
917A	10/18/91	4.4		11.0	U	8.8			Titan, 1994
917A	05/30/92	1.0	UJ	2260.0		1460.0			Titan, 1994
917B	07/02/91	13.0		5130.0		1790.0			Titan, 1994
917B	10/16/91	5.2	J	11.0	U	1.0			Titan, 1994
917B	05/30/92	147.0	J	3580.0		1550.0			Titan, 1994
918	07/02/91	15.6		2670.0		1030.0			Titan, 1994
919A	08/16/91	2.0	U	12.0	U	2.7			Titan, 1994
919A	08/16/91	5.4		12.0	U	3.3			Titan, 1994
919A	10/14/91	2.0	U	11.0	U	1.2			Titan, 1994
919A	05/30/92	2.2	J	27.0	U	3.0	U		Titan, 1994
919B	08/16/91	2.1		12.0	U	3.2			Titan, 1994
919B	10/14/91	2.0	U	11.0	U	1.6			Titan, 1994
919B	05/30/92	1.5		27.0	U	3.0	U		Titan, 1994

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WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
919C	08/16/91	2.0	U	12.0	U	4.3			Titan, 1994
919C	10/11/91	2.0	U	11.0	U	1.2			Titan, 1994
919C	10/11/91	2.0	U	11.3		1.0			Titan, 1994
919C	05/30/92	1.5		27.0	U	3.0	U		Titan, 1994
919C	05/30/92	1.4		27.0	U	3.0	U		Titan, 1994
920	08/04/91	22.2		392.0		3500.0			Titan, 1994
920	10/18/91	23.9		1280.0		4860.0			Titan, 1994
920	06/01/92	28.4		964.0		3080.0			Titan, 1994
921A	08/07/91	4.2		12.0	U	2.2			Titan, 1994
921A	10/15/91	2.0	U	11.0	U	1.0			Titan, 1994
921A	06/01/92	4.3		27.0	U	3.0	U		Titan, 1994
921B	08/07/91	2.2		12.0	U	51.6			Titan, 1994
921B	10/11/91	2.0	U	11.0	U	10.3			Titan, 1994
921B	06/01/92	1.4		27.0	U	44.5			Titan, 1994
922A	10/16/91	1.9	J	11.0	U	4.1			Titan, 1994
922A	06/01/92	2.0		27.0	U	3.0	U		Titan, 1994
922A	06/01/92	2.1		27.0	U	3.0	U		Titan, 1994
922B	10/16/91	11.4	J	11.0	U	2.8			Titan, 1994
922B	06/01/92	12.4		27.0	U	3.0	U		Titan, 1994
922C	10/16/91	7.6	J	11.0	U	90.9			Titan, 1994
922C	10/16/91	8.1	J	11.0	U	90.3			Titan, 1994
922C	05/29/92	11.8		27.0		3.0	U		Titan, 1994
923A	10/18/91	3.7		11.0	U	15.7			Titan, 1994
923A	05/29/92	3.6		27.0	U	3.0	U		Titan, 1994
923B	10/18/91	5.2		11.0	U	25.5			Titan, 1994
923B	10/18/91	5.2		11.0	U	25.1			Titan, 1994
923B	06/01/92	6.0		27.0	U	3.0	U		Titan, 1994
A	11/9/81	1.0			NA		NA	61.0	
A1	6/21/86	3.0		ND		19.0			HLA 1987
A1	11/02/88	2.3		22.6	U	3.2			CDM 1989
A2	11/02/88	7.5		29.8		3.5			CDM 1989
A3	11/02/88	6.3		22.6	U	1.0	UJ		CDM 1989
A4	11/01/88	3.8		22.6	U	1.0	UJ		CDM 1989
A8	6/23/86	ND		ND		2.5			HLA 1987
AC	10/15/91	2.0	U	30.6		3.9			Titan, 1994
AC	05/29/92	1.0	U	27.0	U	3.0	U		Titan, 1994
B	11/9/81	1.0			NA		NA	65.0	
B	10/21/82	2.7		0.0		0.0			
B	8/30/83	1.0		0.0		1.0			
C	11/9/81	1.0			NA		NA	63.0	
C1	12/1/81	15.0			NA		NA	82.5	
C1	8/31/83	8.0		110.0		744.0			
C2	12/1/81	2.5			NA		NA		

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
C2	4/1/82	1.0		0.0		0.0			
C2	9/22/83	1.0		10.0			NA		
C2	8/31/83	1.0		0.0		0.0			
C2	7/13/83	1.2		0.0		0.0			
C2	10/18/83	0.0		5.0		0.0			
C2	11/28/83	0.7		25.0		0.0		148.0	
C2	3/23/84	0.0		0.0		0.0			
C2	5/4/84	0.0		0.0		0.0			
C2	1/27/84	0.0		0.0		0.0			
C2	2/23/84	0.0		0.0		0.0			
C21	12/1/81	2.5		200.0		15.0			
C21	8/31/83	1.0		0.0		1.0			
C21	11/01/88	2.1		22.6	U	22.7			CDM1989
C2A	10/31/88	2.5		22.6	U	1.0	UJ		CDM 1989
C2A	10/31/88	1.9	U	22.6	U	3.2			CDM 1989
C2A	10/31/88	2.7		22.6	U	1.0	UJ		CDM 1989
C2B	10/31/88	3.4		22.6	U	1.9			CDM 1989
C2B	10/31/88	1.9	U	22.6	U	2.6			CDM 1989
C2G	6/14/86	3.0		ND		14.0			HLA 1987
C3	12/1/81	2.5			NA		NA	107.5	
C3	4/1/82	1.0		25.0		5.0			
C3	8/31/83	1.0		0.0		25.0			
C4	12/1/81	5.0			NA		NA	100.5	
C4	4/1/82	1.0		80.0		10.0			
C4	8/31/83	0.7		29.0		16.0			
C5	12/1/81	19.0			NA		NA	54.5	
C6	12/1/81	2.5			NA		NA	103.0	
C6	8/31/83	1.2		0.0		1.0			
C8	12/1/81	2.5			NA		NA	118.5	
C8	8/31/83	1.7		0.0		1.0			
C8	6/20/86	ND		ND		2.5			HLA 1987
C8	11/02/88	2.7		22.6	U	4.2			CDM 1989
D	1/18/82	1.0		40.0		0.0		62.5	
D	4/1/82	2.0		50.0		0.0			
D	10/21/82	2.0		74.0		0.0			
D	2/1/83	1.8		5.0		0.0			
D	5/8/83	1.8		425.0		0.0			
D	7/13/83	2.0		85.0		0.0			
D	8/30/83	1.5		51.0		0.0			
D	9/21/83	2.5		38.0			NA		
D	6/27/84		NA		NA		NA		
D	6/14/86	2.0		ND		8.0			HLA 1987
D	10/5/83	2.5		42.0		0.0			
D	10/19/83	2.5			NA		NA		
D	11/30/83	0.7		25.0		0.0			
D	3/21/84	0.0		0.0		10.0			
DH-21	6/11/86	1400.0		4200.0		12000.0			HLA 1987
DH-21-1	10/4/90	1150.0		30000.0		11100.0		21.5	ENSR 5/91

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
DH-21	06/16/91	1150.0		33400.0		12800.0			Titan, 1994
DH-21	06/16/91	1150.0		33900.0		12900.0			Titan, 1994
DH-23	6/12/86	440.0		30000.0		5700.0			HLA 1987
DH-23-1	10/4/90	92.6	S	19400.0		10700.0		6.5	ENSR 5/91
DH-23	06/15/91	27.0		24500.0		11400.0			Titan, 1994
DH-24	6/12/86	120.0		21000.0		1000.0			HLA 1987
DH-24-1	10/5/90	509.0		24900.0		6800.0		9.5	ENSR 5/91
DH-24	06/15/91	604.0		31800.0		8230.0			Titan, 1994
DH-28	6/11/86	68.0		9.1		9400.0			HLA 1987
DW-9	11/01/88	2.5		22.6	U	1.8			CDM 1989
DW-13	11/02/88	4.1		25.6		4.2			CDM 1989
E	8/30/83	1.8		0.0		1.0		65.0	
F	1/18/82	1.0		40.0		5.0		63.0	
F	8/30/83	0.9		0.0		1.0			
G	10/13/82	43.0		5500.0		3500.0			
G	8/16/83	68.0		8400.0		4397.0			
G	2/23/84	63.0		2840.0		3980.0			
G	3/23/84	72.0		5370.0		4090.0			
G	5/4/84	93.0		6760.0		4120.0			
G	1/27/84	46.0		227.0		2062.0			
G	6/26/84		NA		NA		NA		
G	6/22/86	39.0		4900.0		2800.0			HLA 1987
G.T.C.	6/22/86	ND		ND		2.5			HLA 1987
H	10/21/82	5.0		102.0		2.0		55.0	
H	12/3/82	2.0		23.0		4.0			
H	1/31/83	2.2		17.0		23.0			
H	3/24/83	2.0		22.0		6.0			
H	5/8/83	1.3		34.0		14.0			
H	6/1/83	1.6		15.0			NA		
H	7/12/83	1.8		0.0		14.0			
H	8/30/83	1.4		0.0		2.0			
H3	12/1/81	2.0		100.0		10.0		85.5	
H3	9/1/83	1.1		5.0		1.0			
H4	12/17/81	1.0		140.0		5.0		84.0	
H4	9/1/83	0.7		5.0		1.0			
H8	12/17/81	1.0		170.0		5.0		85.7	
H8	9/1/83	1.0		12.0		1.0			
HB	10/18/91	3.7		11.0	U	1.0	U		Titan, 1994
HB	05/29/92	4.5		27.0	U	3.0	U		Titan, 1994
HLA1	6/18/86	31.0		250.0		980.0			HLA 1987
HLA1	11/3/88	173.0		1650.0		1760.0			CDM 1989
HLA1-1	10/1/90	77.1	N	506.0		1280.0		66.5	ENSR 5/91
HLA-1	06/15/91	116.0		1110.0		1550.0			Titan, 1994
HLA-1	10/15/91	149.0	J	1300.0		1680.0			Titan, 1994
HLA-1	06/02/92	151.0		1690.0		1890.0			Titan, 1994

MILLTOWN WATER QUALITY DATA

WELL NUMBER	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Screen Depth	REFERENCE
HLA2	6/18/86	82.0		60.0		3900.0			HLA 1987
HLA2	11/04/88	101.0		355.0		2820.0			CDM 1989
HLA2-1	9/29/90	3.0	UN	8.0	U	11800.0		58.5	ENSR 5/91
HLA-2	06/15/91	46.1		145.0		2020.0			Titan, 1994
HLA-2	10/15/91	143.0	J	1310.0		1690.0			Titan, 1994
HLA-2	10/18/91	52.6		103.0		2070.0			Titan, 1994
HLA-2	06/02/92	54.8		167.0		2430.0			Titan, 1994
I	1/18/82	1.0		10.0		5.0			
IRM	6/24/86	ND		ND		2.5			HLA 1987
J	8/16/83	5.7		1000.0		3897.0			
J	10/18/83	2.5		8300.0		1787.0			
L	8/31/83	1.4		23.0		5.0		68.2	
M16	8/31/83	1.3		0.0		6.0		59.5	
M16	3/23/84	0.0		0.0		0.0			
M16	6/21/86	ND		ND		2.5			HLA 1987
M16	11/03/88	2.9		22.6	U	3.2			CDM 1989
M17	8/16/83	1.0		50.0		112.0		78.0	
M17	10/21/83	2.5		12.0		67.0			
M17	6/21/86	ND		ND		22.0			HLA 1987
M17	11/04/88	9.7		884.0		241.0			CDM 1989
M17	9/28/90	56.1		4520.0		1000.0			ENSR 5/91
M17	06/15/91	207.0		27770.0		694.0			Titan, 1994
M17	06/15/91	43.4		2680.0		682.0			Titan, 1994
M17	10/14/91	75.8		5340.0		1300.0			Titan, 1994
M17	06/01/92	62.7	J	4240.0	J	925.0			Titan, 1994
MT19	11/01/88	2.2		22.6	U	1.0	UJ		CDM 1989
OH	6/16/86	5.0		ND		11.0			HLA 1987
OH	11/02/88	7.4		34.1		1.0	UJ		CDM 1989
T.G	6/22/86	ND		ND		2.5			HLA 1987
T.N.	6/22/86	ND		ND		2.5			HLA 1987

NOTES:
BDL-Below detection limit
NA- Not analyzed
ND-Not detected
U- Undetected
UJ- Undetected but estimated
B- Qualified due to blank contamination problems
W- Post digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
N- Spiked sample recovery not within control limits
S- Reported value determined by MSA

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APPENDIX C

Milltown Adjusted Water Quality Data

APPENDIX C

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
2	12/1/81	13.0		200.0		180.0		100.0	Woessner, et. al, 1984
2	4/1/82	9.0		100.0		190.0			unless otherwise
2	1/31/83	8.9		691.0		100.0			indicated.
2	3/24/83	15.0		896.0		25.0			
2	5/8/83	11.0		564.0		25.0			
2	7/13/83	11.0		301.0		290.0			
2	8/31/83	6.9		625.0		299.0			
2	10/19/83	5.0			NA		NA		
2	11/29/83	4.2		1000.0		180.0			
2	3/23/84	8.0		452.0		230.0			
2	6/27/84		NA		NA		NA		
3	12/1/81	5.0		50.0		15.0			
3	8/31/83	1.1		50.0		25.0			
6	5/18/81	350.0		50.0		14000.0		75.0	
6	6/30/81	190.0			NA	9200.0			
6	7/6/81	150.0			NA	8400.0			
6	7/8/81	150.0			NA	8600.0			
6	8/28/81	220.0			NA		NA		
6	9/30/81	140.0			NA		NA		
6	10/26/81	260.0			NA		NA		
6	11/2/81	370.0			NA		NA		
6	11/9/81	0.2			NA		NA		
6	12/17/81	388.0		200.0		9900.0			
6	4/1/82	540.0		180.0		8650.0			
6	10/21/82	294.0		227.0		7320.0			
6	12/3/82	296.0		460.0		7420.0			
6	2/1/83	157.0		64.0		5730.0			
6	3/24/83	283.0		50.0		6160.0			
6	3/31/83	274.0		364.0			NA		
6	4/8/83	283.0		345.0			NA		
6	4/17/83	299.0		412.0			NA		
6	4/23/83	389.0		388.0		5520.0			
6	5/7/83	436.0		572.0		8640.0			
6	5/17/83	473.0		431.0			NA		
6	5/25/83	373.0		457.0		8330.0			
6	6/1/83	234.0		296.0			NA		
6	6/14/83	144.0		130.0		7980.0			
6	6/23/83	150.0		421.0			NA		
6	7/1/83	113.0		330.0		5550.0			
6	7/8/83	167.0		153.0			NA		
6	7/13/83	204.0		227.0		6580.0			
6	7/20/83	247.0		34.0			NA		
6	8/30/83	261.0		708.0		7697.0			
6	9/21/83	165.0		381.0			NA		
6	10/5/83	153.0		201.0		5394.0			
6	10/20/83	138.0			NA		NA		
6	11/28/83	182.0		260.0		5780.0			
6	1/26/84	7.2		15.0		4000.0			
6	2/21/84	8.8		15.0		3770.0			
6	3/21/84	110.0		172.0		5700.0			
6	4/24/84		NA	620.0		6600.0			
6	6/27/84		NA		NA		NA		
7	11/9/81	2.5			NA		NA	90.0	
7	12/1/81	60.0		800.0		50.0			
7	12/1/81	30.0		200.0		15.0			
7	12/1/81	30.0		200.0		15.0			
7	10/21/82	25.0		428.0		92.0			
7	12/3/82	22.0		592.0		169.0			
7	2/1/83	33.0		464.0		76.0			

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
7	3/24/83	20.0		604.0		68.0			
7	5/8/83	33.0		778.0		915.0			
7	7/13/83	23.0		1100.0		867.0			
7	8/30/83	27.0		102.0		54.0			
7	9/21/83	27.3		828.0			NA		
7	10/5/83	27.0		40.0		121.0			
7	10/20/83	31.0			NA		NA		
7	11/29/83	16.0		1100.0		1280.0			
8	11/2/81	39.0			NA		NA	63.0	
8	12/1/81	396.0		800.0		6900.0			
8	12/17/81	510.0		1050.0		6870.0			
8	4/1/82	390.0		100.0		7250.0			
8	10/21/82	182.0		24.0		3520.0			
8	12/3/82	333.0		58.0		12890.0			
8	2/1/83	215.0		389.0			NA		
8	3/24/83	283.0		98.0		6260.0			
8	4/23/83	544.0		1300.0		7660.0			
8	5/7/83	291.0		537.0		6820.0			
8	5/24/83	297.0		353.0		6800.0			
8	6/1/83	240.0		403.0			NA		
8	6/14/83	234.0		545.0		5710.0			
8	6/23/83	199.0		687.0			NA		
8	7/1/83	237.0		625.0		6510.0			
8	7/8/83	230.0		230.0			NA		
8	7/13/83	153.0		611.0		6310.0			
8	8/20/83	129.0		423.0			NA		
8	8/30/83	112.0		502.0		8197.0			
8	9/21/83	184.0		258.0			NA		
8	10/5/83	31.0		1300.0		8694.0			
8	10/20/83	364.0			NA		NA		
8	3/21/84	58.0		1960.0		5500.0			
8	6/27/84		NA		NA		NA		
9	11/2/81	380.0			NA		NA	62.0	
9	12/1/82	440.0		1300.0		15.0			
9	4/1/82	510.0		9140.0		6980.0			
9	10/21/82	703.0		11000.0		6310.0			
9	12/3/82	658.0		18000.0		8290.0			
9	1/31/83	613.0		24000.0		6330.0			
9	3/24/83	632.0		17000.0		7800.0			
9	3/31/83	747.0		14000.0			NA		
9	4/8/83	770.0		9400.0			NA		
9	4/17/83	726.0		16000.0			NA		
9	4/23/83	825.0		14000.0		8550.0			
9	5/8/83	761.0		11000.0		6410.0			
9	5/17/83	470.0		12000.0			NA		
9	5/25/83	544.0		9000.0		5100.0			
9	6/1/83	619.0		9200.0			NA		
9	6/14/83	570.0		11000.0			NA		
9	6/23/83	317.0		12000.0		6430.0			
9	7/1/83	570.0		12000.0			NA		
9	7/8/83	458.0		12000.0		6080.0			
9	7/13/83	530.0		12000.0		7870.0			
9	7/20/83	805.0		12000.0		10000.0			
9	8/30/83	527.0		9500.0		8197.0			
9	9/21/83	552.0		8900.0		8398.0			
9	10/5/83	518.0		11000.0		6594.0			
9	10/5/83	554.0		9900.0		6594.0			
9	10/20/83	527.0			NA		NA		
9	11/30/83	104.0		12000.0		6780.0			
9	1/26/84	590.0		12930.0		7300.0			

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
9	3/23/84	690.0		12960.0		7300.0			
9	4/24/84	620.0		13000.0		7500.0			
9	6/27/84		NA		NA		NA		
10	12/1/81	224.0		100.0		15.0		89.0	
10	4/1/82	310.0		50.0		20.0			
10	10/21/82	205.0		322.0		39.0			
10	12/3/82	218.0		136.0		8.0			
10	1/31/83	294.0			NA	30.0			
10	3/24/83	226.0			NA	53.0			
10	4/17/83	138.0		945.0			NA		
10	4/23/83	167.0		82.0		626.0			
10	5/8/83	146.0		107.0		564.0			
10	5/17/83	141.0		461.0			NA		
10	5/23/83	144.0		55.0		637.0			
10	6/1/83	136.0		173.0			NA		
10	6/14/83	170.0		62.0		983.0			
10	6/23/83	165.0		73.0			NA		
10	7/1/83	213.0		651.0		413.0			
10	7/8/83	192.0		24.0			NA		
10	7/13/83	201.0		5.0		28.0			
10	7/20/83	252.0		24.0			NA		
10	8/30/83	172.0		21.0		645.0			
10	9/21/82	241.0		16.0			NA		
10	10/5/83	169.0		5.0		294.0			
10	10/20/83	209.0			NA		NA		
10	11/28/83	116.0		25.0		209.0			
10	3/23/84	180.0		72.0		160.0			
10	6/27/84		NA		NA		NA		
11	11/2/81	26.0		1800.0		3300.0		55.0	
11	4/1/82	11.0		910.0		2830.0			
11	1/31/83	20.0		754.0		2730.0			
11	5/8/83	20.0		890.0		27.0			
11	7/13/83	18.0		603.0		2730.0			
11	8/30/83	15.0		1000.0		2997.0			
11	9/21/83	12.0		656.0			NA		
11	10/20/83	18.0		600.0		2187.0			
11	11/1/83	22.0		1500.0		2480.0			
17	12/1/81	5.0		50.0		30.0		96.0	
17	4/1/82	22.0		25.0		5.0			
17	3/24/83	2.5		50.0		5.0			
17	5/8/83	2.5		50.0		5.0			
17	8/31/83	2.5		50.0		25.0			
17	9/22/83	2.5		50.0			NA		
17	10/19/83	2.5			NA		NA		
17	11/29/83	2.5		50.0		25.0			
18	12/1/81	5.0		300.0		15.0		71.5	
18	8/30/83	2.5		50.0		25.0			
19	12/1/81	5.0		50.0		15.0		80.0	
19	4/1/82	2.5		25.0		5.0			
19	7/13/83	2.5		23.0		8.0			
19	8/30/83	2.5		50.0		25.0			
19	3/23/84	2.5		15.0		10.0			
19	6/27/84	2.5		15.0		10.0			
20	12/1/81	4.5		50.0		15.0		70.0	
20	5/8/83	5.2		50.0		5.0			
20	7/13/83	4.8		50.0		25.0			

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
20	9/1/83	4.0		129.0		25.0			
20	9/22/83	4.6		170.0			NA		
20	10/19/83	2.5			NA		NA		
21	9/1/83	2.5		15.0		10.0		86.0	
23	12/1/81	5.0		50.0		60.0		53.5	
23	9/1/83	2.5		50.0		25.0			
23	6/22/86	1.0		25.0		2.5			HLA 1987
24	9/1/83	2.5		50.0		25.0		64.7	
25	9/1/83	2.5		50.0		25.0		91.0	
26	9/1/83	2.5		50.0		25.0		83.0	
27	9/1/83	2.5		50.0		25.0		27.0	
28	4/1/82	2.5		50.0		5.0		74.5	
28	9/1/83	2.5		50.0		25.0			
29	8/31/83	2.5		50.0		2497.0		125.0	
30	8/11/83	2.5		50.0		25.0		95.0	
30	8/31/83	2.5		50.0		25.0			
35	11/29/83	2.5		80.0		25.0			
35-1	9/26/90	5.0	UW	59.2	B	5.6			ENSR 5/91
35-2	9/27/90	5.0	UW	60.8	B	6.5	B		ENSR 5/91
35-3	9/27/90	5.0	UW	63.2	B	10.2	B		ENSR 5/91
035	06/07/91	1.0	U	22.5		5.8			Titan, 1994
36	11/29/83	2.5		50.0		25.0			
36	6/22/86	1.0		25.0		2.5			HLA 1987
36-1	9/26/90	5.0	U	4.0	U	4.6	B		ENSR 5/91
36-2	9/27/90	5.0	UW	50.0	U	9.3	B		ENSR 5/91
36-3	9/28/90	5.0	UW	613.0		33.5			ENSR 5/91
036	06/07/91	1.0	U	10.0	U	9.2			Titan, 1994
99A	1/26/84	2.5		15.0		162.0		115.2	
99A	2/21/84	2.5		15.0		10.0			
99A	3/20/84	2.5		15.0		10.0			
99A	5/3/84	2.5		15.0		10.0			
99A-1	10/3/90	5.0	U	50.0	U	483.0		110.1	ENSR 5/91
099A	06/11/91	2.1		31.9		478.0			Titan, 1994
99B	1/26/84	2.5		15.0		10.0			
99B	2/24/83	2.5		15.0		10.0			
99B	3/20/84	2.5		15.0		10.0		78.7	
99B	5/3/84	2.5		15.0		10.0			
99B-1	10/2/90	5.0	UW	50.0	U	7.5	U	73.7	ENSR 5/91
099B	06/11/91	1.0	U	10.0	U	1.9			Titan, 1994
100A	12/2/83	29.0		400.0		298.0		58.4	
100A	6/17/86	1400.0		20000.0		11000.0			HLA 1987
100A	10/1/90	1250.0		20600.0		8960.0	N	53.4	ENSR 5/91
100A	06/16/91	1010.0		21600.0		9080.0			Titan, 1994
100A	10/15/91	1140.0		23000.0		9850.0			Titan, 1994
100A	06/02/92	1110.0		23000.0		9900.0			Titan, 1994
100B	12/1/83	412.0		560.0		3280.0		44.3	
100B	6/17/86	1400.0		20000.0		10000.0			HLA 1987
100B-1	10/1/90	1500.0		22500.0		10200.0	N	39.3	ENSR 5/91
100B	06/16/91	1260.0		24500.0		10500.0			Titan, 1994

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
100B	10/15/91	1450.0		24700.0		10500.0			Titan, 1994
100B	06/02/92	1300.0		24500.0		10600.0			Titan, 1994
101A	12/2/83	145.0		25.0		5680.0		6.4	
101B	8/16/83	704.0		17000.0		10997.0		35.1	
101B	9/21/83	746.0		13000.0		9998.0			
101B	10/5/83	737.0		19000.0		9894.0			
101B	10/21/83	708.0		15000.0		9587.0			
101B	12/1/83	634.0		15000.0		8780.0			
101B	1/27/84	884.0		22920.0		9362.0			
101B	2/21/84	860.0		16940.0		9080.0			
101B	3/21/84	861.0		17870.0		9490.0			
101B	5/3/84	823.0		17860.0		9920.0			
101B-1	10/2/90	1070.0		20400.0		11400.0	N	30.1	ENSR 5/91
101B	06/16/91	976.0		2500.0		11500.0			Titan, 1994
101B	10/15/91	941.0	J	24000.0		11800.0			Titan, 1994
101B	06/03/92	974.0		19800.0		10800.0			Titan, 1994
102A	12/1/83	631.0		8400.0		5980.0		61.7	
102A	6/16/86	660.0		9000.0		54000.0			HLA 1987
102A-1	10/2/90	828.0		11600.0		6760.0	N	56.7	ENSR 5/91
102A	06/15/91	874.0		11400.0		6130.0			Titan, 1994
102A	10/15/91	805.0		12200.0		6740.0			Titan, 1994
102A	06/03/92	829.0		13500.0		7120.0			Titan, 1994
102B	12/1/83	621.0		12000.0		5880.0		48.9	
102B	1/27/84	974.0		19920.0		6632.0			
102B	2/21/84	1100.0		27940.0		6880.0			
102B	3/21/84	771.0		38870.0		5990.0			
102B	5/3/84	853.0		41860.0		6320.0			
102B	6/16/86	520.0		7600.0		6000.0			HLA 1987
102B-1	10/2/90	829.0		12900.0		7060.0	N	43.9	ENSR 5/91
102B	06/15/91	806.0		17200.0		7380.0			Titan, 1994
102B	10/15/91	1010.0		18500.0		7780.0			Titan, 1994
102B	06/03/92	1070.0		20400.0		8380.0			Titan, 1994
103A	11/29/83	2.5		700.0		980.0		89.6	
103A	6/18/86	7.0		110.0		700.0			HLA 1987
103A	10/15/91	42.6	J	413.0		2630.0			Titan, 1994
103B	11/29/83	24.0		200.0		2280.0		75.5	
103B	3/20/84	2.5		340.0		2090.0			
103B	6/18/86	32.0		720.0		2900.0			HLA 1987
103B-1	10/3/90	47.0		380.0		3230.0		70.4	ENSR 5/91
103B	06/15/91	42.4		972.0		3110.0			Titan, 1994
103B	10/18/91	49.9		1420.0		3560.0			Titan, 1994
103B	06/02/92	57.9		1210.0		3410.0			Titan, 1994
104A-1	10/1/90	8.5	BN	50.0	U	2430.0	N	95.7	ENSR 5/91
104A	06/13/91	8.7		10.0	U	2250.0			Titan, 1994
104A	06/13/91	7.6		10.0	U	2290.0			Titan, 1994
104B	11/28/83	16.3		200.0		3080.0		84.6	
104B	1/26/84	4.0		50.0		2162.0			
104B	2/21/84	16.0		186.0		3080.0			
104B	3/20/84	2.5		110.0		3490.0			
104B	5/3/84	10.0		50.0		3720.0			
104B-1	10/1/90	11.6	N	50.0	U	2500.0	N	79.6	ENSR 5/91
104B	06/13/91	11.6		10.0	U	2590.0			Titan, 1994
105A	11/28/83	2.5		50.0		928.0		124.0	
105A-1	10/4/90	7.7	B	50.0	U	916.0		118.9	ENSR 5/91
105A	06/11/91	2.6		10.0	U	970.0			Titan, 1994
105B	11/28/83	2.5		50.0		25.0		94.2	
105B	1/26/84	2.5		15.0		10.0			

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
105B	2/21/84	2.5		15.0		44.0			
105B	3/20/84	2.5		15.0		10.0			
105B	5/3/84	2.5		15.0		10.0			
105B-1	10/4/90	3.5	B	11.2	B	4.3	B	89.1	ENSR 5/91
105B	06/11/91	1.0	U	10.0	U	2.4			Titan, 1994
105C	11/28/83	2.5		50.0		780.0		72.2	
105C-1	10/3/90	5.0	U	50.0	U	67.0		67.1	ENSR 5/91
105C	06/11/91	1.0	U	10.0	U	0.5	U		Titan, 1994
106A	10/18/83	2.5		50.0		99.0		121.1	
106A	11/30/83	2.5		50.0		280.0			
106A	1/30/84	2.5		397.0		10.0			
106A	2/23/84	2.5		15.0		10.0			
106A	3/20/84	2.5		15.0		40.0			
106A	6/20/86	1.0		25.0		7.0			HLA 1987
106A-1	10/4/90	5.0	U	32.1	B	15.4		116.0	ENSR 5/91
106A	06/11/91	1.0	U	10.0	U	2.4			Titan, 1994
106B	10/18/83	2.5		50.0		120.0		112.2	
106B	11/30/83	7.0		50.0		25.0			
106B	6/20/86	1.0		25.0		2.5			HLA 1987
106B-1	10/2/90	5.0	UW	50.0	U	7.5	U	69.8	ENSR 5/91
106B	06/12/91	1.0	U	10.0	U	1.5			Titan, 1994
106C	10/18/83	2.5		50.0		41.0			
106C	11/30/83	2.5		50.0		25.0		105.0	
106C	6/13/86	2.0		25.0		7.0			HLA 1987
106C-1	10/2/90	5.0	UW	50.0	U	7.5	U	100.0	ENSR 5/91
106C	06/12/91	1.0	U	10.0	U	2.9			Titan, 1994
107A	10/18/83	105.0		300.0		4187.0			
107A	11/29/83	211.0		3200.0		4780.0		95.1	
107A	3/20/84	54.0		1070.0		3290.0			
107A	6/19/86	1.0		5100.0		4700.0			HLA 1987
107B	10/18/83	2.5		13.5	U	487.0			
107B	11/29/83	2.5		800.0		380.0		119.1	
107B	6/19/86	8.0		25.0		170.0			HLA 1987
107B-1	10/3/90	4.8	B	15300.0		6670.0		114.0	ENSR 5/91
107B	06/13/91	1.0	U	56.3		104.0			Titan, 1994
107B	10/15/91	2.9	J	19.7		106.0			Titan, 1994
107B	10/15/91	3.5	J	99.4		104.0			Titan, 1994
107B	06/02/92	2.2		13.5	U	89.1			Titan, 1994
107C	10/19/83	766.0		7000.0		4987.0			
107C	11/29/83	23.0		240.0		2280.0		70.9	
107C	3/20/84	361.0		3470.0		4890.0			
107C	6/16/86	48.0		490.0		1900.0			HLA 1987
107C-1	10/3/90	1450.0		15300.0		6670.0		65.8	ENSR 5/91
107C	08/09/91	556.0		9280.0		5690.0			Titan, 1994
107C	10/15/91	1260.0	J	12300.0		6770.0			Titan, 1994
107C	06/02/92	331.0		6360.0		5340.0			Titan, 1994
107C	06/02/92	377.0		6450.0		5430.0			Titan, 1994
108A	10/19/83	2.5		50.0		120.0			
108A	12/2/83	2.5		50.0		25.0		96.1	
108A	6/19/86	1.0		90.0		140.0			HLA 1987
108A-1	9/29/90	5.0	UN	30.0	B	7.5	UN	91.9	ENSR 2/19/91
108A	06/09/91	1.0	U	10.0	U	2.4			Titan, 1994
108B	10/19/83	25.0		50.0		25.0			
108B	12/2/83	2.5		50.0		25.0		44.9	
108B	3/20/84	2.5		15.0		10.0			
108B	6/17/86	1.0		25.0		12.0			HLA 1987
108B-1	9/29/90	5.0	UN	50.0	U	3.3	B	39.9	ENSR 5/91
108B	06/09/91	1.0	U	10.0	U	1.0	U		Titan, 1994

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
109A	10/19/83	2.5		50.0		487.0		133.9	
109A	12/2/83	2.5		50.0		25.0			
109A	6/21/86	1.0		25.0		2.5			HLA 1987
109A-1	10/2/90	5.0	UN	179.0		1120.0		120.8	ENSR 5/91
109B	10/19/83	2.5		50.0		487.0			
109B	12/2/83	2.5		240.0		580.0		98.1	
109B	1/26/84	2.5		15.0		262.0			
109B	2/21/84	2.5		15.0		226.0			
109B	3/20/84	2.5		15.0		40.0			
109B	5/3/84	2.5		15.0		355.0			
109B-1	10/2/90	4.0	B	32.8	B	7.5	U	93.0	ENSR 5/91
109B	06/09/91	1.0	U	380.0		1310.0			Titan, 1994
110A	11/30/83	2.5		50.0		422.0			
110A	3/20/84	2.5		15.0		10.0		136.2	
110A	6/20/86	7.0		25.0		11.0			HLA 1987
110A-1	10/6/90	5.8	B	20.9	B	825.0		131.1	ENSR 5/91
110A	06/13/91	1.0	U	10.0	U	3.4			Titan, 1994
110B	11/28/83	50.0		50.0		980.0			
110B	3/20/84	2.5		15.0		10.0		70.5	
110B	6/20/86	15.0		25.0		1200.0			HLA 1987
110B-1	10/6/90	17.5		50.0	U	4.9	B	65.5	ENSR 5/91
110B	06/13/91	14.0		10.0	U	840.0			Titan, 1994
111A	11/28/83	2.5		150.0		25.0			
111A	3/21/84	2.5		15.0		10.0		143.1	
111A-1	10/3/90	5.0	U	50.0	U	7.5	U	138.0	ENSR 5/91
111A	06/11/91	1.0	U	10.0	U	2.4			Titan, 1994
111B	11/23/83	2.5		50.0		25.0			
111B	3/21/84	2.5		15.0		10.0		88.9	
111B-1	10/3/90	5.0	U	8.0		3.0		82.9	ENSR 5/91
111B	06/11/91	1.0	U	10.0	U	0.5	U		Titan, 1994
113	9/22/83	397.0		3800.0		9098.0			
113	10/7/83	268.0		1200.0		6894.0		9.1	
113	10/20/83	431.0			NA		NA		
114	9/22/83	81.3		1200.0		5998.0			
114	10/7/83	104.0		2600.0		4694.0		9.5	
114	10/20/83	78.0			NA		NA		
114	6/12/86	88.0		1700.0		1100.0			HLA 1987
115	9/22/83	56.4		14000.0		9998.0			
115	10/7/83	29.0		19000.0		9794.0		9.5	
115	10/20/83		NA		NA		NA		
115	11/18/83	38.0		8300.0		7786.0			
116	9/22/83	153.0		10000.0		3998.0			
116	10/7/83	134.0		11000.0		3594.0		10.2	
116	11/18/83	101.0		8800.0		3386.0			
117	11/16/83	19.0		12000.0		8286.0			
118A	11/14/83	110.0		4100.0		3786.0		10.5	
118A	6/10/86	250.0		32000.0		6300.0			HLA 1987
118B	11/14/83	256.0		14000.0		3586.0		12.0	
119A	11/16/83	322.0		18000.0		5786.0		8.0	
119A	6/14/86	116.0		24000.0		61000.0			HLA 1987
119B	11/16/83	5100.0		23000.0		3186.0			
120	11/14/83	32.0		3300.0		8586.0		14.2	

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Depth (ft.)	REFERENCE
121A	11/16/83	214.0	22000.0	6086.0	6.0	
121A	1/27/84	260.0	32930.0	7900.0	13.5	
121A	2/23/84	220.0	30930.0	7970.0		
121A	3/21/84	160.0	34960.0	8300.0		
121A	4/27/84	270.0	34000.0	8000.0		
121A	6/11/86	210.0	32000.0	8200.0		HLA 1987
121A	9/21/86	360.0	29109.0	8281.0	15.8	UDALOY 1988
121A	10/19/86	370.0	30761.0	8643.2		UDALOY 1988
121A	11/15/86	440.0	31040.0	8365.6		UDALOY 1988
121A	1/31/87	280.0	30921.0	8761.3		UDALOY 1988
121A	2/28/87	280.0	28165.0	8463.0		UDALOY 1988
121A	3/30/87	310.0	29999.0	8337.0		UDALOY 1988
121B	11/16/83	24.0	14000.0	8786.0		
121B	2/24/84	20.0	62930.0	8770.0	7.0	
121B	3/21/84	19.0	19960.0	9000.0		
121B	4/23/87	15.0	4297.0	8304.0	8.6	UDALOY 1988
121B	5/16/87	15.0	9900.0	9387.6		UDALOY 1988
121B	6/15/87	30.0	11181.0	9259.5		UDALOY 1988
121B	7/14/87	40.0	12704.0	9519.5		UDALOY 1988
121B	8/14/87	20.0	9825.0	9703.3		UDALOY 1988
121D	8/9/86	90.0	1206.0	4203.5	11.6	UDALOY 1988
121D	8/15/86	50.0	4.0	4003.5		UDALOY 1988
121D	4/23/87	70.0	12146.0	4405.0		UDALOY 1988
121D	5/16/87	50.0	12842.0	5104.5		UDALOY 1988
121D	6/15/87	30.0	11941.0	5379.4		UDALOY 1988
121D	7/14/87	40.0	12004.0	5666.5		UDALOY 1988
121D	8/14/87	60.0	15194.0	5310.2		UDALOY 1988
121E	8/9/86	110.0	21603.0	4165.5	14.5	UDALOY 1988
121E	8/15/86	90.0	22036.0	4162.5		UDALOY 1988
121E	9/21/86	120.0	25008.0	4252.0		UDALOY 1988
121E	10/19/86	120.0	26011.0	4187.1		UDALOY 1988
121E	11/15/86	120.0	26248.0	4181.6		UDALOY 1988
121E	1/31/87	180.0	28281.0	4950.3		UDALOY 1988
121E	2/28/87	130.0	23725.0	4949.7		UDALOY 1988
121E	3/30/87	190.0	26201.0	4837.0		UDALOY 1988
121E	4/23/87	140.0	28044.0	4345.9		UDALOY 1988
121E	5/16/87	120.0	28371.0	4444.4		UDALOY 1988
121E	6/15/87	130.0	27201.0	4044.3		UDALOY 1988
121E	7/14/87	140.0	27154.0	4230.4		UDALOY 1988
121E	8/14/87	160.0	27373.0	4153.1		UDALOY 1988
121F	8/9/86	150.0	20224.0	9430.5	17.5	UDALOY 1988
121F	8/15/86	140.0	22114.0	9709.5		UDALOY 1988
121F	10/19/86	240.0	28000.0	10283.0		UDALOY 1988
121F	11/15/86	280.0	27646.0	9984.6		UDALOY 1988
121F	1/31/87	220.0	26491.0	9330.4		UDALOY 1988
121F	2/28/87	160.0	20236.0	9029.4		UDALOY 1988
121F	3/30/87	200.0	21908.0	9096.0		UDALOY 1988
121F	4/23/87	200.0	27713.0	8784.8		UDALOY 1988
121F	5/16/87	190.0	27471.0	8717.3		UDALOY 1988
121F	6/15/87	190.0	24961.0	7862.2		UDALOY 1988
121F	7/14/87	200.0	24714.0	7770.4		UDALOY 1988
121F	8/14/87	200.0	24363.0	7686.1		UDALOY 1988
121F	9/21/86	200.0	24986.0	9867.0		UDALOY 1988
122A	11/16/83	3700.0	22000.0	4886.0		
122A	1/27/84	6200.0	55930.0	5500.0	4.0	
122A	2/24/84	7000.0	59930.0	5470.0		
122A	3/21/84	7300.0	63960.0	5800.0		
122A	4/27/84	6600.0	61000.0	5500.0		
122A	6/14/86	5000.0	55000.0	6000.0		HLA 1987
122A	8/15/86	6000.0	58170.0	5667.2	16.7	UDALOY 1988

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Depth (ft.)	REFERENCE
122A	9/21/86	6200.0	5932.0	5514.0		UDALOY 1988
122A	10/19/86	6000.0	54058.0	5408.3		UDALOY 1988
122A	11/15/86	6930.0	56574.0	5555.6		UDALOY 1988
122A	1/31/87	6900.0	58814.0	5530.2		UDALOY 1988
122A	2/28/87	6220.0	55653.0	5560.3		UDALOY 1988
122A	3/30/87	7270.0	58336.0	5517.6		UDALOY 1988
122A	4/23/87	6070.0	58709.0	5482.9		UDALOY 1988
122A	5/16/87	5830.0	60451.0	5640.2		UDALOY 1988
122A	6/15/87	5950.0	60317.0	5504.7		UDALOY 1988
122A	7/14/87	5640.0	59434.0	5348.1		UDALOY 1988
122A	8/14/87	5850.0	59440.0	5372.2		UDALOY 1988
122A-1	10/4/90	6350.0	61600.0	5730.0	13.2	ENSR 5/91
122A	06/16/91	4980.0	63000.0	5870.0		Titan, 1994
122B	11/16/83	10.0	28000.0	2786.0		
122B	1/27/84	89.0	28930.0	13000.0	7.0	
122B	2/24/84	210.0	58930.0	12970.0		
122B	3/21/84	94.0	59960.0	13000.0		
122B	4/27/84	100.0	59000.0	12000.0		
122B	8/15/86	15.0	10090.0	13578.4	8.6	UDALOY 1988
122B	4/23/87	15.0	24907.0	13386.8		UDALOY 1988
122B	5/16/87	15.0	43649.0	14763.2		UDALOY 1988
122B	6/15/87	15.0	46206.0	14048.7		UDALOY 1988
122B	7/14/87	15.0	41703.0	12324.1		UDALOY 1988
122B	8/14/87	10.0	29269.0	11973.1		UDALOY 1988
122D	8/15/86	15.0	2467.0	5059.7	11.6	UDALOY 1988
122D	9/21/86	60.0	3465.0	4245.0		UDALOY 1988
122D	10/19/86	100.0	7378.0	4445.1		UDALOY 1988
122D	11/15/86	430.0	22262.0	4764.0		UDALOY 1988
122D	1/31/87	120.0	24719.0	4446.9		UDALOY 1988
122D	2/28/87	150.0	17953.0	4440.4		UDALOY 1988
122D	3/30/87	80.0	46906.0	4413.9		UDALOY 1988
122D	4/23/87	80.0	54744.0	4509.7		UDALOY 1988
122D	5/16/87	130.0	58556.0	4702.9		UDALOY 1988
122D	6/15/87	150.0	60185.0	4917.6		UDALOY 1988
122D	7/14/87	140.0	56543.0	4651.1		UDALOY 1988
122D	8/14/87	170.0	53618.0	4708.1		UDALOY 1988
122E	9/21/86	3550.0	48252.0	3428.0	14.6	UDALOY 1988
122E	10/19/86	3920.0	49037.0	3240.0		UDALOY 1988
122E	11/15/86	4430.0	51132.0	3231.3		UDALOY 1988
122E	1/31/87	2850.0	46144.0	3713.6		UDALOY 1988
122E	2/28/87	2620.0	47873.0	3782.5		UDALOY 1988
122E	3/30/87	3040.0	52626.0	3843.1		UDALOY 1988
122E	4/23/87	2470.0	49712.0	3641.8		UDALOY 1988
122E	5/16/87	2580.0	51958.0	3723.8		UDALOY 1988
122E	6/15/87	2890.0	55274.0	3832.5		UDALOY 1988
122E	7/14/87	2480.0	46773.0	3535.1		UDALOY 1988
122E	8/14/87	2820.0	51368.0	3590.1		UDALOY 1988
123A	11/17/83	5500.0	20000.0	3286.0		
123A	1/27/84	8500.0	37930.0	3000.0	13.1	
123A	2/23/84	9500.0	40930.0	1970.0		
123A	3/21/84	10000.0	45960.0	3100.0		
123A	4/27/84	9300.0	44000.0	2900.0		
123A	6/14/86	3900.0	14000.0	3700.0		HLA 1987
123A	11/15/86	8490.0	23247.0	3669.6	16.7	UDALOY 1988
123A	12/15/86	9050.0	26854.0	3665.1		UDALOY 1988
123A	1/31/87	9120.0	24751.0	3726.5		UDALOY 1988
123A	2/28/87	8130.0	22856.0	3718.1		UDALOY 1988
123A	3/30/87	8780.0	26249.0	3534.0		UDALOY 1988
123A	4/23/87	9370.0	39402.0	3297.6		UDALOY 1988
123A	5/16/87	9250.0	42033.0	3377.0		UDALOY 1988
123A	6/15/87	9800.0	43151.0	3297.1		UDALOY 1988

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Depth (ft.)	REFERENCE
123A	7/14/87	9590.0	42743.0	3267.4		UDALOY 1988
123A	8/14/87	9920.0	43862.0	3250.0		UDALOY 1988
123B	11/18/83	2200.0	41000.0	3686.0		
123B	1/27/84	3400.0	44930.0	3300.0	7.5	
123B	2/23/84	4700.0	52930.0	2970.0		
123B	3/21/84	4900.0	55960.0	3200.0		
123B	4/27/84	4500.0	55000.0	3100.0		
123B	4/23/87	3140.0	57580.0	3104.5	12.5	UDALOY 1988
123B	5/16/87	3110.0	57222.0	3159.1		UDALOY 1988
123B	6/15/87	3130.0	56168.0	3044.1		UDALOY 1988
123B	7/14/87	2950.0	51663.0	3071.3		UDALOY 1988
123B	8/14/87	3540.0	57832.0	3088.9		UDALOY 1988
123C	11/18/83	22.0	7800.0	7836.0	7.2	UDALOY 1988
123C	4/23/87	15.0	2647.0	14116.4		UDALOY 1988
123C	5/16/87	15.0	7147.0	16508.1		UDALOY 1988
123C	6/15/87	15.0	7696.0	20173.1		UDALOY 1988
123C	7/14/87	15.0	1965.0	25384.3		UDALOY 1988
123C	8/14/87	10.0	1152.0	31726.8		UDALOY 1988
123D	8/9/86	4670.0	25365.0	3054.5	17.6	UDALOY 1988
123D	8/15/86	5790.0	31533.0	3067.5		UDALOY 1988
123D	9/21/86	5470.0	30785.0	2559.0		UDALOY 1988
123D	10/19/86	7490.0	39879.0	2723.0		UDALOY 1988
123D	11/15/86	5970.0	26075.0	3054.5		UDALOY 1988
123D	1/31/87	4030.0	11531.0	2624.5		UDALOY 1988
123D	2/28/87	4820.0	20466.0	3028.8		UDALOY 1988
123D	3/30/87	3680.0	17156.0	2897.0		UDALOY 1988
123D	4/23/87	7460.0	40237.0	3309.4		UDALOY 1988
123D	5/16/87	7970.0	42648.0	3736.2		UDALOY 1988
123D	6/15/87	8560.0	43825.0	3709.2		UDALOY 1988
123D	7/14/87	8360.0	43936.0	3555.7		UDALOY 1988
123D	8/14/87	9220.0	47860.0	3655.7		UDALOY 1988
123E	8/9/86	1430.0	63645.0	3456.3	13.2	UDALOY 1988
123E	9/21/86	1510.0	64243.0	3344.0		UDALOY 1988
123E	8/15/86	710.0	52931.0	3539.5		UDALOY 1988
123E	10/19/86	1280.0	64366.0	3477.9		UDALOY 1988
123E	11/15/86	1610.0	62864.0	3387.5		UDALOY 1988
123E	12/15/86	1710.0	70372.0	3530.9		UDALOY 1988
123E	1/31/87	2050.0	71099.0	3420.4		UDALOY 1988
123E	2/28/87	1440.0	64715.0	3433.8		UDALOY 1988
123E	3/30/87	1750.0	69424.0	3418.0		UDALOY 1988
123E	4/23/87	1630.0	67280.0	3126.2		UDALOY 1988
123E	5/16/87	1680.0	71366.0	3309.2		UDALOY 1988
123E	6/15/87	1900.0	70383.0	3217.2		UDALOY 1988
123E	7/14/87	1690.0	69206.0	3206.7		UDALOY 1988
123E	8/14/87	1560.0	73420.0	3372.6		UDALOY 1988
123F	8/9/86	1730.0	69734.0	3509.1	13.2	UDALOY 1988
123F	8/15/86	1500.0	62132.0	3425.5		UDALOY 1988
123F	9/21/86	1710.0	68472.0	3523.0		UDALOY 1988
123F	10/19/86	1880.0	64126.0	3651.9		UDALOY 1988
123F	11/15/86	1930.0	63192.0	3603.4		UDALOY 1988
123F	12/15/86	1680.0	69970.0	3764.8		UDALOY 1988
123F	1/31/87	2410.0	73797.0	3688.3		UDALOY 1988
123F	2/28/87	1420.0	61693.0	3668.4		UDALOY 1988
123F	3/30/87	1900.0	71631.0	3623.0		UDALOY 1988
123F	4/23/87	1930.0	66329.0	3105.2		UDALOY 1988
123F	5/16/87	1990.0	71094.0	3356.3		UDALOY 1988
123F	6/15/87	2170.0	69332.0	3190.3		UDALOY 1988
123F	7/14/87	2130.0	70453.0	3267.6		UDALOY 1988
123F	8/14/87	1840.0	75179.0	3476.5		UDALOY 1988
124	11/17/83	5.0	4000.0	11986.0	5.5	
124A	4/23/87	580.0	39341.0	8544.2	8.4	UDALOY 1988

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Depth (ft.)	REFERENCE
124A	5/16/87	720.0	53146.0	8181.9		UDALOY 1988
124A	6/15/87	730.0	54103.0	7790.4		UDALOY 1988
124A	7/14/87	770.0	49465.0	6158.5		UDALOY 1988
124A	8/14/87	810.0	45497.0	5464.1		UDALOY 1988
124B	8/15/86	1200.0	10251.0	2375.9	8.3	UDALOY 1988
124B	3/30/87	3330.0	21637.0	2106.4		UDALOY 1988
124B	4/23/87	3940.0	44889.0	2675.1		UDALOY 1988
124B	5/16/86	5400.0	46675.0	2.3		UDALOY 1988
124B	6/15/87	6700.0	48832.0	2196.3		UDALOY 1988
124B	7/14/87	6370.0	43544.0	1871.5		UDALOY 1988
124B	8/14/87	6510.0	44137.0	1828.1		UDALOY 1988
124C	8/15/86	1310.0	29060.0	9034.9	11.5	UDALOY 1988
124C	9/21/86	390.0	43542.0	13918.0		UDALOY 1988
124C	10/19/86	1130.0	37076.0	11164.8		UDALOY 1988
124C	11/15/86	820.0	43771.0	13855.4		UDALOY 1988
124C	1/31/87	500.0	48016.0	15405.2		UDALOY 1988
124C	2/28/87	740.0	47103.0	15336.7		UDALOY 1988
124C	3/30/87	530.0	50408.0	15829.6		UDALOY 1988
124C	4/23/87	520.0	47077.0	14405.9		UDALOY 1988
124C	5/16/87	640.0	45695.0	13597.9		UDALOY 1988
124C	6/15/87	550.0	45251.0	988.3		UDALOY 1988
124C	7/14/87	540.0	43843.0	13554.4		UDALOY 1988
124C	8/14/87	450.0	45427.0	14453.0		UDALOY 1988
124D	9/21/86	250.0	38472.0	10888.0	14.5	UDALOY 1988
124D	10/19/86	180.0	37307.0	11314.9		UDALOY 1988
124D	11/15/86	240.0	31871.0	9952.4		UDALOY 1988
124D	1/31/87	150.0	36635.0	10825.1		UDALOY 1988
124D	2/28/87	130.0	39922.0	11736.7		UDALOY 1988
124D	3/30/87	350.0	49558.0	13847.7		UDALOY 1988
124D	4/23/87	190.0	45415.0	13625.8		UDALOY 1988
124D	5/16/87	220.0	41571.0	12257.1		UDALOY 1988
124D	6/15/87	210.0	41519.0	12308.3		UDALOY 1988
124D	7/14/87	240.0	40313.0	11984.3		UDALOY 1988
124D	8/14/87	190.0	41245.0	12233.2		UDALOY 1988
124E	8/15/86	240.0	16049.0	5372.7	17.5	UDALOY 1988
124E	9/21/86	270.0	12891.0	5512.0		UDALOY 1988
124E	10/19/86	530.0	29689.0	5247.0		UDALOY 1988
124E	11/15/86	890.0	35940.0	5337.5		UDALOY 1988
124E	1/31/87	1080.0	34910.0	4924.1		UDALOY 1988
124E	2/28/87	540.0	27852.0	4787.7		UDALOY 1988
124E	3/30/87	840.0	29579.0	4680.9		UDALOY 1988
124E	4/23/87	930.0	35253.0	4822.6		UDALOY 1988
124E	5/16/87	1000.0	36370.0	4677.0		UDALOY 1988
124E	6/15/87	1140.0	37619.0	4780.4		UDALOY 1988
124E	7/14/87	1020.0	37062.0	4631.3		UDALOY 1988
124E	8/14/87	1000.0	41114.0	5243.3		UDALOY 1988
125	11/17/83	31.0	2500.0	7986.0	5.5	
126	11/16/83	106.0	300.0	5686.0	6.8	
127	11/16/83	11.0	4100.0	17986.0	5.5	
128	11/16/83	26.0	6200.0	5886.0	6.0	
129	11/18/83	446.0	21.0	1786.0	5.0	
130	11/18/83	15.0	2000.0	16896.0	5.5	
131	11/18/83	20.0	1150.0	24986.0	5.5	
136	11/16/83	40.0	6700.0	4186.0	5.5	

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L	Fe ug/L	Mn ug/L	Well Depth (ft.)	REFERENCE
137A	8/15/86	70.0	208.0	3673.5	8.5	UDALOY 1988
137A	4/23/87	15.0	537.5	10866.2		UDALOY 1988
137A	5/16/87	15.0	18268.0	14313.3		UDALOY 1988
137A	6/15/87	40.0	28810.0	17953.4		UDALOY 1988
137A	7/14/87	80.0	26163.0	15864.1		UDALOY 1988
137A	8/14/87	60.0	22478.0	16436.4		UDALOY 1988
137B	8/9/86	70.0	414.0	3848.6	12.0	UDALOY 1988
137B	8/15/86	50.0	2375.0	3799.5		UDALOY 1988
137B	9/21/86	150.0	9280.0	3211.0		UDALOY 1988
137B	10/19/86	230.0	10725.0	3164.9		UDALOY 1988
137B	11/15/86	420.0	18053.0	3120.1		UDALOY 1988
137B	12/15/86	2740.0	45868.0	3753.6		UDALOY 1988
137B	1/31/87	210.0	10380.0	3002.2		UDALOY 1988
137B	2/28/87	100.0	3837.0	2618.1		UDALOY 1988
137B	3/30/87	390.0	20563.0	3136.2		UDALOY 1988
137B	4/23/87	740.0	34306.0	3181.1		UDALOY 1988
137B	5/16/87	830.0	36447.0	3179.3		UDALOY 1988
137B	6/15/87	880.0	34730.0	3036.4		UDALOY 1988
137B	7/14/87	950.0	34316.0	2897.1		UDALOY 1988
137B	8/14/87	1040.0	36448.0	3079.4		UDALOY 1988
137C	8/9/86	420.0	135.0	4402.9	16.0	UDALOY 1988
137C	9/21/86	130.0	41.0	2633.0		UDALOY 1988
137C	10/19/86	270.0	439.0	2217.8		UDALOY 1988
137C	11/15/86	1300.0	7718.0	2553.9		UDALOY 1988
137C	1/31/87	2870.0	20345.0	2492.9		UDALOY 1988
137C	2/28/87	2690.0	15846.0	2346.6		UDALOY 1988
137C	3/30/87	1000.0	4423.0	2106.3		UDALOY 1988
137C	4/23/87	3850.0	36785.0	2978.1		UDALOY 1988
137C	5/16/87	4590.0	43616.0	3015.4		UDALOY 1988
137C	6/15/87	5420.0	44771.0	2930.4		UDALOY 1988
137C	7/14/87	5120.0	44706.0	2622.8		UDALOY 1988
137C	8/14/87	5710.0	46307.0	2838.3		UDALOY 1988
137D	8/9/86	5790.0	35821.0	5239.4	18.6	UDALOY 1988
137D	8/15/86	5600.0	34343.0	5302.5		UDALOY 1988
137D	9/21/86	6840.0	39041.0	5373.0		UDALOY 1988
137D	10/19/86	7200.0	39744.0	5580.8		UDALOY 1988
137D	11/15/86	8130.0	44703.0	5645.8		UDALOY 1988
137D	12/15/86	7020.0	40186.0	5716.4		UDALOY 1988
137D	1/31/87	7750.0	44200.0	5822.3		UDALOY 1988
137D	2/28/87	6780.0	37667.0	5647.4		UDALOY 1988
137D	3/30/87	8190.0	44996.0	5773.4		UDALOY 1988
137D	4/23/87	6900.0	50133.0	6055.1		UDALOY 1988
137D	5/16/87	6880.0	50305.0	6121.4		UDALOY 1988
137D	6/15/87	7060.0	50051.0	5974.5		UDALOY 1988
137D	7/14/87	7120.0	49845.0	5823.7		UDALOY 1988
137D	8/14/87	7440.0	51756.0	6143.2		UDALOY 1988
138A	8/15/86	200.0	2582.0	6009.6	8.5	UDALOY 1988
138A	4/23/87	15.0	11772.0	58156.0		UDALOY 1988
138A	5/16/87	50.0	19333.0	55866.0		UDALOY 1988
138A	6/15/87	70.0	25029.0	48938.4		UDALOY 1988
138A	7/14/87	80.0	19404.0	46013.6		UDALOY 1988
138A	8/14/87	40.0	12494.0	43093.5		UDALOY 1988
138B	8/15/86	70.0	566.0	3944.4	12.9	UDALOY 1988
138B	9/21/86	230.0	2955.0	3920.0		UDALOY 1988
138B	10/19/86	200.0	1107.0	3867.2		UDALOY 1988
138B	11/15/86	370.0	6510.0	4330.5		UDALOY 1988
138B	1/31/87	110.0	997.0	4027.1		UDALOY 1988
138B	2/28/87	60.0	287.0	4608.7		UDALOY 1988
138B	3/30/87	600.0	11310.0	5399.0		UDALOY 1988
138B	4/23/87	2500.0	51592.0	5828.7		UDALOY 1988

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
138B	5/16/87	2520.0		52221.0		6084.0			UDALOY 1988
138B	6/15/87	2620.0		51419.0		55814.0			UDALOY 1988
138B	7/14/87	2790.0		51463.0		5578.6			UDALOY 1988
138B	8/14/87	2750.0		49753.0		5429.6			UDALOY 1988
138C	9/21/86	4080.0		57621.0		5081.0		14.5	UDALOY 1988
138C	10/19/86	4050.0		57091.0		4868.4			UDALOY 1988
138C	11/15/86	4660.0		58080.0		5162.6			UDALOY 1988
138C	1/31/87	4690.0		61500.0		5226.0			UDALOY 1988
138C	2/28/87	4230.0		60461.0		50977.0			UDALOY 1988
138C	3/30/87	4850.0		63052.0		50957.0			UDALOY 1988
138C	4/23/87	4470.0		65892.0		5629.7			UDALOY 1988
138C	5/16/87	4520.0		67059.0		5983.7			UDALOY 1988
138C	6/15/87	3830.0		59919.0		5173.5			UDALOY 1988
138C	7/14/87	4250.0		62281.0		5278.5			UDALOY 1988
138C	8/14/87	4480.0		61022.0		5365.8			UDALOY 1988
138D	8/15/86	2140.0		30146.0		7406.2		19.5	UDALOY 1988
138D	9/21/86	3190.0		40650.0		8726.0			UDALOY 1988
138D	10/19/86	4050.0		49953.0		10045.5			UDALOY 1988
138D	11/15/86	3150.0		29810.0		11855.6			UDALOY 1988
138D	1/31/87	2850.0		27660.0		12125.8			UDALOY 1988
138D	2/28/87	2030.0		19301.0		11846.0			UDALOY 1988
138D	3/30/87	5180.0		51572.0		13310.4			UDALOY 1988
138D	4/23/87	5410.0		60162.0		13965.7			UDALOY 1988
138D	5/16/87	5310.0		61057.0		14362.5			UDALOY 1988
138D	6/15/87	5500.0		59629.0		13958.5			UDALOY 1988
138D	7/14/87	5630.0		60070.0		13973.5			UDALOY 1988
138D	8/14/87	5410.0		57681.0		13394.0			UDALOY 1988
901-1	10/6/90	367.0		14800.0		10100.0		22.1	ENSR 5/91
901	06/15/91	320.0		17400.0		11200.0			Titan, 1994
901	10/15/91	415.0	J	16500.0		10900.0			Titan, 1994
901	06/03/92	412.0		17000.0		11200.0			Titan, 1994
902-1	10/6/90	21.1		6500.0		1570.0		14.0	ENSR 5/91
902	06/13/91	10.9		28300.0		4910.0			Titan, 1994
902	06/13/91	9.7		27800.0		4880.0			Titan, 1994
903-1	10/6/90	400.0		15300.0		11100.0		24.6	ENSR 5/91
903	06/15/91	382.0		17400.0		10300.0			Titan, 1994
903	06/15/91	376.0		17200.0		10200.0			Titan, 1994
903	10/15/91	555.0	J	19800.0		11100.0			Titan, 1994
903	06/03/92	612.0		21600.0		10100.0			Titan, 1994
904-1	10/4/90	666.0		7590.0		6100.0		51.5	ENSR 5/91
904	08/07/91	234.0		5100.0		3190.0			Titan, 1994
904	10/18/91	992.0		15200.0		7270.0			Titan, 1994
904	06/02/92	470.0		9290.0		4390.0			Titan, 1994
905-1	10/5/90	158.0		1480.0		3970.0		54.7	ENSR 5/91
905	06/15/91	627.0		2040.0		3320.0			Titan, 1994
905	10/18/91	178.0		3990.0		4360.0			Titan, 1994
905	06/02/92	167.0		4090.0		4130.0			Titan, 1994
906-1	10/5/90	3.5	B	8.2	B	7.5	U	92.5	ENSR 5/91
906	06/11/91	8.9		67.1		1280.0			Titan, 1994
907-1	9/27/90	5.0	UW	13.0	B	3.7	B	31.0	ENSR 5/91
907	06/07/91	1.0	U	10.0	U	0.5	U		Titan, 1994
907	10/14/91	1.0	U	12.5		3.6			Titan, 1994
907	10/14/91	1.0	U	5.5	U	1.0			Titan, 1994
907	06/01/92	0.5	U	13.5	U	1.5	U		Titan, 1994

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
908-1	10/1/90	16.4	N	43.5	B	360.0	N	86.5	ENSR 5/91
908	06/15/91	144.0		2790.0		2760.0			Titan, 1994
908	10/15/91	128.0		654.0		4320.0			Titan, 1994
908	10/18/91	291.0		3060.0		2940.0			Titan, 1994
908	06/01/92	135.0	J	2740.0	J	2390.0			Titan, 1994
909A-1	10/1/90	90.0	NS	412.0		4070.0		57.2	ENSR 5/91
909A	06/15/91	113.0		599.0		3740.0			Titan, 1994
909A	10/15/91	128.0		654.0		4320.0			Titan, 1994
909A	06/01/92	187.0	J	926.0	J	4300.0			Titan, 1994
909B-1	10/1/90	5.0	UN	8.0		13.6	BN	25.3	ENSR 5/91
909B	06/11/91	1.0	U	10.0	U	2.9			Titan, 1994
909B	06/11/91	1.0	U	10.0	U	2.4			Titan, 1994
909B	10/15/91	0.5	UR	5.5	U	92.2			
909B	06/02/92	1.8		13.5	U	12.4			Titan, 1994
909B	06/02/92	1.7		13.5	U	12.0			Titan, 1994
910	06/11/91	3.1		9610.0		4040.0			Titan, 1994
910A-1	9/28/90	5.0	UW	199.0		988.0		20.5	ENSR 5/91
910A	06/13/91	1.0	U	100.0		787.0			Titan, 1994
910B-1	9/28/90	5.4	B	2790.0		3940.0		7.4	ENSR 5/91
911A-1	9/29/90	5.0	UW	50.0	U	7.5	U	20.0	ENSR 5/91
911A	06/11/91	2.6		10.0	U	138.0			Titan, 1994
911B-1	9/29/90	5.0	U	118.0		330.0		9.5	ENSR 5/91
911B	06/10/91	1.0	U	10.0	U	38.8			Titan, 1994
912-1	9/28/90	5.0	UW	50.0	U	3.0	B	10.0	ENSR 5/91
912	06/10/91	1.0	U	10.0	U	1.9			Titan, 1994
913A-1	9/27/90	5.0	UW	122.0		432.0		20.3	ENSR 5/91
913A	06/09/91	1.0	U	10.0	U	15.5			Titan, 1994
913A	06/11/91	1.0	U	10.0	U	16.5			Titan, 1994
913B	06/09/91	1.0	U	2390.0		1210.0			Titan, 1994
914-1	9/28/90	5.0	U	11.3	B	3.7	B	90.0	ENSR 5/91
914	06/09/91	1.0	U	10.0	U	3.9			Titan, 1994
914	06/09/91	1.0	U	10.0	U	2.9			Titan, 1994
915-1	9/29/90	5.0	UN	8.7	B	7.5	UN	40.0	ENSR 5/91
915	06/11/91	1.0	U	10.0	U	1.9			Titan, 1994
915	10/15/91	3.2		5.5	U	3.2			Titan, 1994
915	10/15/91	3.4		5.5	U	1.9			Titan, 1994
915	06/01/92	3.1		57.5		1.5	U		Titan, 1994
916A	07/02/91	1.5	U	10.0	U	19.0			Titan, 1994
916A	10/16/91	0.5	UR	5.5	U	6.7			Titan, 1994
916A	06/01/92	0.5	UJ	13.5	U	1.5	U		Titan, 1994
916B	07/02/91	1.5	U	10.0	U	3.2			Titan, 1994
916B	10/16/91	0.5	UR	5.5	U	1.2			Titan, 1994
916B	06/01/92	2.3	J	13.5	U	1.5	U		Titan, 1994
917A	07/02/91	137.0		3410.0		2110.0			Titan, 1994
917A	07/02/91	127.0		3410.0		2110.0			Titan, 1994
917A	10/18/91	3.9		5.5	U	8.8			Titan, 1994
917A	10/18/91	4.4		5.5	U	8.8			Titan, 1994
917A	05/30/92	0.5	UJ	2260.0		1460.0			Titan, 1994
917B	07/02/91	13.0		5130.0		1790.0			Titan, 1994
917B	10/16/91	5.2	J	5.5	U	1.0			Titan, 1994
917B	05/30/92	147.0	J	3580.0		1550.0			Titan, 1994

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
918	07/02/91	15.6		2670.0		1030.0			Titan, 1994
919A	08/16/91	1.0		6.0	U	2.7			Titan, 1994
919A	08/16/91	5.4		6.0	U	3.3			Titan, 1994
919A	10/14/91	1.0	U	5.5	U	1.2			Titan, 1994
919A	05/30/92	2.2	J	13.5	U	1.5	U		Titan, 1994
919B	08/16/91	2.1		6.0	U	3.2			Titan, 1994
919B	10/14/91	1.0	U	5.5	U	1.6			Titan, 1994
919B	05/30/92	1.5		13.5	U	1.5	U		Titan, 1994
919C	08/16/91	1.0	U	6.0	U	4.3			Titan, 1994
919C	10/11/91	1.0	U	5.5	U	1.2			Titan, 1994
919C	10/11/91	1.0	U	11.3		1.0			Titan, 1994
919C	05/30/92	1.5		13.5	U	1.5	U		Titan, 1994
919C	05/30/92	1.4		13.5	U	1.5	U		Titan, 1994
920	08/04/91	22.2		392.0		3500.0			Titan, 1994
920	10/18/91	23.9		1280.0		4860.0			Titan, 1994
920	06/01/92	28.4		964.0		3080.0			Titan, 1994
921A	08/07/91	4.2		6.0	U	2.2			Titan, 1994
921A	10/15/91	1.0	U	5.5	U	1.0			Titan, 1994
921A	06/01/92	4.3		13.5	U	1.5	U		Titan, 1994
921B	08/07/91	2.2		6.0	U	51.6			Titan, 1994
921B	10/11/91	1.0	U	5.5	U	10.3			Titan, 1994
921B	06/01/92	1.4		13.5	U	44.5			Titan, 1994
922A	10/16/91	1.9	J	5.5	U	4.1			Titan, 1994
922A	06/01/92	1.0		13.5	U	1.5	U		Titan, 1994
922A	06/01/92	2.1		13.5	U	1.5	U		Titan, 1994
922B	10/16/91	11.4	J	5.5	U	2.8			Titan, 1994
922B	06/01/92	12.4		13.5	U	1.5	U		Titan, 1994
922C	10/16/91	7.6	J	5.5	U	90.9			Titan, 1994
922C	10/16/91	8.1	J	5.5	U	90.3			Titan, 1994
922C	05/29/92	11.8		13.5	U	1.5	U		Titan, 1994
923A	10/18/91	3.7		5.5	U	15.7			Titan, 1994
923A	05/29/92	3.6		13.5	U	1.5	U		Titan, 1994
923B	10/18/91	5.2		5.5	U	25.5			Titan, 1994
923B	10/18/91	5.2		5.5	U	25.1			Titan, 1994
923B	06/01/92	6.0		13.5	U	1.5	U		Titan, 1994
A	11/9/81	2.5			NA		NA	61.0	
AC	10/15/91	1.0	U	30.6		3.9			Titan, 1994
AC	05/29/92	0.5	U	13.5	U	1.5	U		Titan, 1994
A1	11/02/88	2.3		11.5	U	3.2			CDM 1989
A1	6/21/86	3.0		25.0		19.0			HLA 1987
A2	11/02/88	7.5		29.8		3.5			CDM 1989
A3	11/02/88	6.3		11.5	U	1.0	UJ		CDM 1989
A4	11/01/88	3.8		11.5	U	1.0	UJ		CDM 1989
A8	6/23/86	1.0		25.0		2.5			HLA 1987
B	11/9/81	2.5			NA		NA	65.0	
B	10/21/82	2.7		50.0		5.0			
B	8/30/83	2.5		50.0		25.0			

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
C	11/9/81	2.5			NA		NA	63.0	
C1	12/1/81	15.0			NA		NA	82.5	
C1	8/31/83	8.0		110.0		744.0			
C2A	10/31/88	2.5		11.5	U	1.0	UJ		CDM 1989
C2A	10/31/88	2.7		11.5	U	1.0	UJ		CDM 1989
C2A	10/31/88	1.0	U	11.5	U	3.2			CDM 1989
C2B	10/31/88	3.4		11.5	U	1.9			CDM 1989
C2B	10/31/88	1.0	U	11.5	U	2.6			CDM 1989
C2	12/1/81	2.5			NA		NA		
C2	4/1/82	2.5		50.0		25.0			
C2	7/13/83	2.5		50.0		25.0			
C2	8/31/83	2.5		50.0		25.0			
C2	9/22/83	2.5		50.0			NA		
C2	10/18/83	2.5		50.0		25.0			
C2	11/28/83	2.5		50.0		25.0		148.0	
C2	1/27/84	2.5		50.0		25.0			
C2	2/23/84	2.5		50.0		25.0			
C2	3/23/84	2.5		15.0		10.0			
C2	5/4/84	2.5		15.0		10.0			
C2G	6/14/86	3.0		25.0		14.0			HLA 1987
C3	12/1/81	2.5			NA		NA	107.5	
C3	4/1/82	2.5		50.0		5.0			
C3	8/31/83	2.5		50.0		25.0			
C4	12/1/81	5.0			NA		NA	100.5	
C4	4/1/82	2.5		80.0		10.0			
C4	8/31/83	2.5		29.0		16.0			
C5	12/1/81	19.0			NA		NA	54.5	
C6	12/1/81	2.5			NA		NA	103.0	
C6	8/31/83	2.5		50.0		25.0			
C8	12/1/81	2.5			NA		NA	118.5	
C8	8/31/83	2.5		50.0		25.0			
C8	6/20/86	1.0		25.0		2.5			HLA 1987
C8	11/02/88	2.7		11.5	U	4.2			CDM 1989
C21	12/1/81	2.5		200.0		15.0			
C21	8/31/83	2.5		50.0		25.0			
C21	11/01/88	2.1		11.5	U	22.7			CDM1989
	Average	2.4		87.2		20.9			
D	1/18/82	2.5		50.0		5.0		62.5	
D	4/1/82	2.5		50.0		5.0			
D	10/21/82	2.5		74.0		5.0			
D	2/1/83	2.5		50.0		25.0			
D	5/8/83	2.5		50.0		25.0			
D	7/13/83	2.5		85.0		25.0			
D	8/30/83	2.5		51.0		25.0			
D	9/21/83	2.5		50.0			NA		
D	10/5/83	2.5		50.0		25.0			
D	10/19/83	2.5			NA		NA		
D	11/30/83	2.5		50.0		25.0			
D	3/21/84	2.5		15.0		10.0			
D	6/27/84		NA		NA		NA		

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
D	6/14/86	2.0		25.0		8.0			HLA 1987
DH-21	6/11/86	1400.0		4200.0		12000.0			HLA 1987
DH-21-1	10/4/90	1150.0		30000.0		11100.0		21.5	ENSR 5/91
DH-21	06/16/91	1150.0		33400.0		12800.0			Titan, 1994
DH-21	06/16/91	1150.0		33900.0		12900.0			Titan, 1994
DH-23	6/12/86	440.0		30000.0		5700.0			HLA 1987
DH-23-1	10/4/90	92.6	S	19400.0		10700.0		6.5	ENSR 5/91
DH-23	06/15/91	27.0		24500.0		11400.0			Titan, 1994
DH-24	6/12/86	120.0		21000.0		1000.0			HLA 1987
DH-24-1	10/5/90	509.0		24900.0		6800.0		9.5	ENSR 5/91
DH-24	06/15/91	604.0		31800.0		8230.0			Titan, 1994
DH-28	6/11/86	68.0		9.1		9400.0			HLA 1987
DW-13	11/02/88	4.1		25.6		4.2			CDM 1989
DW-9	11/01/88	2.5		11.5	U	1.8			CDM 1989
E	8/30/83	2.5		50.0		25.0		65.0	
F	1/18/82	2.5		50.0		5.0		63.0	
F	8/30/83	2.5		50.0		25.0			
G	10/13/82	43.0		5500.0		3500.0			
G	8/16/83	68.0		8400.0		4397.0			
G	1/27/84	46.0		227.0		2062.0			
G	2/23/84	63.0		2840.0		3980.0			
G	3/23/84	72.0		5370.0		4090.0			
G	5/4/84	93.0		6760.0		4120.0			
G	6/26/84		NA		NA		NA		
G	6/22/86	39.0		4900.0		2800.0			HLA 1987
G.T.C.	6/22/86	1.0		25.0		2.5			HLA 1987
H	10/21/82	5.0		102.0		5.0		55.0	
H	12/3/82	2.5		50.0		5.0			
H	1/31/83	2.5		50.0		25.0			
H	3/24/83	2.5		50.0		25.0			
H	5/8/83	2.5		50.0		25.0			
H	6/1/83	2.5		50.0			NA		
H	7/12/83	2.5		50.0		25.0			
H	8/30/83	2.5		50.0		25.0			
H3	12/1/81	2.5		100.0		10.0		85.5	
H3	9/1/83	2.5		50.0		25.0			
H4	12/17/81	2.5		50.0		5.0		84.0	
H4	9/1/83	7.0		50.0		25.0			
H8	12/17/81	2.5		50.0		5.0		85.7	
H8	9/1/83	2.5		50.0		25.0			
HB	10/18/91	3.7		5.5	U	0.5	U		Titan, 1994
HB	05/29/92	4.5		13.5	U	1.5	U		Titan, 1994
HLA1	6/18/86	31.0		250.0		980.0			HLA 1987
HLA1	11/3/88	173.0		1650.0		1760.0			CDM 1989
HLA1-1	10/1/90	77.1	N	506.0		1280.0		66.5	ENSR 5/91
HLA-1	06/15/91	116.0		1110.0		1550.0			Titan, 1994

MILLTOWN ADJUSTED WATER QUALITY DATA

WELL NUMBE	DATE	As ug/L		Fe ug/L		Mn ug/L		Well Depth (ft.)	REFERENCE
HLA-1	10/15/91	149.0	J	1300.0		1680.0			Titan, 1994
HLA-1	06/02/92	151.0		1690.0		1890.0			Titan, 1994
HLA2	6/18/86	82.0		60.0		3900.0			HLA 1987
HLA2	11/04/88	101.0		355.0		2820.0			CDM 1989
HLA2-1	9/29/90	5.0	UN	50.0	U	11800.0		58.5	ENSR 5/91
HLA-2	06/15/91	46.1		145.0		2020.0			Titan, 1994
HLA-2	10/15/91	143.0	J	1310.0		1690.0			Titan, 1994
HLA-2	10/18/91	52.6		103.0		2070.0			Titan, 1994
HLA-2	06/02/92	54.8		167.0		2430.0			Titan, 1994
I	1/18/82	2.5		50.0		5.0			
IRM	6/24/86	1.0		25.0		2.5			HLA 1987
J	8/16/83	5.7		1000.0		3897.0			
J	10/18/83	2.5		8300.0		1787.0			
L	8/31/83	2.5		50.0		25.0		68.2	
M16	8/31/83	2.5		50.0		25.0		59.5	
M16	3/23/84	2.5		50.0		25.0			
M16	6/21/86	1.0		25.0		2.5			HLA 1987
M16	11/03/88	2.9		11.5	U	3.2			CDM 1989
M17	8/16/83	1.0		50.0		112.0		78.0	
M17	10/21/83	2.5		12.0		67.0			
M17	6/21/86	2.5		50.0		22.0			HLA 1987
M17	11/04/88	9.7		884.0		241.0			CDM 1989
M17	9/28/90	56.1		4520.0		1000.0			ENSR 5/91
M17	06/15/91	207.0		27770.0		694.0			Titan, 1994
M17	06/15/91	43.4		2680.0		682.0			Titan, 1994
M17	10/14/91	75.8		5340.0		1300.0			Titan, 1994
M17	06/01/92	62.7	J	4240.0	J	925.0			Titan, 1994
MT19	11/01/88	2.2		11.5	U	1.0	UJ		CDM 1989
OH	6/16/86	5.0		25.0		11.0			HLA 1987
OH	11/02/88	7.4		34.1		1.0	UJ		CDM 1989
T.G	6/22/86	1.0		25.0		2.5			HLA 1987
T.N.	6/22/86	1.0		25.0		2.5			HLA 1987

NOTES:

NA- Not analyzed
U- Undetected
UJ- Undetected but estimated
B- Qualified due to blank contamination problems
W- Post digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
N- Spiked sample recovery not within control limits
S- Reported value determined by MSA

DETECTION LIMITS AND ESTIMATES

Concentrations reported below detection limits are set to 0.5 of the limit value, if the value is known, otherwise the published value is listed.

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APPENDIX D

Milltown Median Water Quality Values

APPENDIX D

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
2	9	10	564	9	180	9
3	3	2	50	2	20	2
6	220	37	260	29	6600	19
7	20	15	592	13	84	12
8	234	23	502	21	6820	15
9	570	30	12000	28	6980	21
10	186	24	72	21	185	16
11	18	9	890	9	2730	8
17	3	8	50	7	15	6
18	4	2	175	2	20	2
19	3	6	26	6	10	6
20	5	6	50	5	20	4
21	3	1	15	1	10	1
23	3	3	50	3	25	3
24	3	1	50	1	25	1
25	3	1	50	1	25	1
26	3	1	50	1	25	1
27	3	1	50	1	25	1
28	3	2	50	2	15	2
29	3	1	50	1	2497	1

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
30	3	2	50	2	25	2
35	5	5	63	5	7	5
36	5	6	38	6	9	6
99	3	12	15	12	10	12
100	1255	12	22750	12	10100	12
101	842	14	17865	14	9907	14
102	828	16	12450	16	6750	16
103	37	10	557	10	2765	10
104	9	10	50	10	2545	10
105	3	13	15	13	25	13
106	3	18	29	18	9	18
107	48	21	1070	21	4187	21
108	3	11	50	11	12	11
109	3	12	42	12	309	12
110	6	10	23	10	217	10
111	3	8	15	8	9	8
113	397	3	2500	2	7996	2
114	84	4	1700	3	4694	3
115	38	3	14000	3	9794	3

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
116	134	3	10000	3	3594	3
117	19	1	12000	1	8286	1
118	250	3	14000	3	3786	3
119	322	3	23000	3	5786	3
120	32	1	3300	1	8586	1
121	140	51	24986	51	7970	51
122	2835	54	53838	54	5439	54
123	3130	73	11531.00	73	3377.00	73
124	610	48	41180	48	8363	48
125	31	1	2500	1	7986	1
126	106	1	300	1	5686	1
127	11	1	4100	1	17986	1
128	26	1	6200	1	5886	1
129	446	1	21	1	1786	1
130	15	1	2000	1	16896	1
131	20	1	1150	1	24986	1
136	40	1	6700	1	4186	1
137	1995	46	34536	46	3777	46
138	2850	41	51419	41	6084	41
901	390	4	16750	4	11050	4

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
902	11	3	27800	3	4880	3
903	400	5	17400	5	10300	5
904	352	4	6345	4	5230	4
905	168	4	1760	4	3645	4
906	602	2	37	2	643	2
907	1	5	13	5	2	5
908	135	5	2740	5	2760	5
909	5	10	14	10	53	10
910	3	3	199	3	988	3
911	4	4	30	4	88	4
912	3	2	30	2	3	2
913	1	4	66	4	224	4
914	1	3	10	3	4	3
915	3	5	9	5	2	5
916	1	6	10	6	2	6
917	9	8	2835	8	1510	8
918	16	1	2670	1	1030	1
919	1	12	6	12	2	12
920	34	3	964	3	3500	3

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
921	1	6	6	6	6	6
922	9	8	10	8	2	8
923	5	5	6	5	16	5
A	3	1		0		0
A1	3	2	18	2	11	2
A2	8	1	30	1	4	1
A3	6	1	12	1	1	1
A4	4	1	12	1	1	1
A8	1	1	25	1	3	1
AC	1	2	22	2	3	2
B	3	2	50	2	15	2
C	3	1		0		0
C1	12	2	110	1	744	1
C2	3	17	38	16	20	16
C3	3	3	50	2	15	2
C4	3	3	80	3	10	3
C5	19	1		0		0
C6	3	2	50	1	25	1
C8	3	4	25	3	4	4
C21	3	3	50	3	23	3

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
D	3	13	50	12	25	11
DH-21	1150	4	31700	4	12400	4
DH-23	93	3	24500	3	10700	3
DH-24	509	3	34900	3	6800	3
DH-28	68	1	9	1	9400	1
DW-13	4	1	26	1	4	1
DW-9	3	1	12	1	2	1
E	3	1	50	1	25	1
F	3	2	50	2	15	2
G	63	7	5370	7	3980	7
G.T.C.	1	1	25	1	3	1
H	3	8	50	8	25	7
H3	3	2	75	2	18	2
H4	5	2	50	2	15	2
H8	3	2	50	2	15	2
HB	4	2	9	2	1	2
HLA1	133	6	1205	6	1615	6
HLA2	55	7	145	7	2430	7
I	3	1	50	1	5	1

MEDIAN WATER QUALITY VALUES

WELL NUMBER	As (ug/L)	n	Fe (ug/L)	n	Mn (ug/L)	n
IRM	1	1	25	1	3	1
J	4	2	4650	2	2842	2
L	3	1	50	1	25	1
M16	3	4	38	4	14	4
M17	43	9	2680	9	682	9
MT19	2	1	12	1	1	1
OH	6	2	30	2	6	2
T.G	1	1	25	1	3	1
T.N.	1	1	25	1	3	1

n = number of samples taken.